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TRANSACTIONS OF THE

Illinois State Academy of Science

Supplement to Volume 88

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BOTANICAL GARDEN

88th Annual Meeting
October 6-7, 1995

EASTERN ILLINOIS UNIVERSITY
Charleston, Illinois

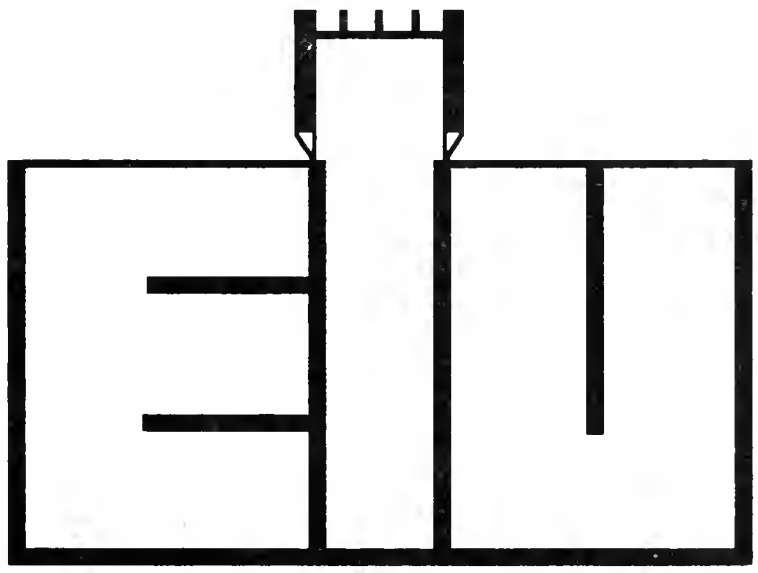
$3.00

PROGRAM AND ABSTRACTS OF THE ILLINOIS STATE ACADEMY OF SCIENCE

88th Annual Meeting

SUSTAINING PLANET EARTH

OCTOBER 6-7, 1995



EASTERN ILLINOIS UNIVERSITY
CHARLESTON, ILLINOIS

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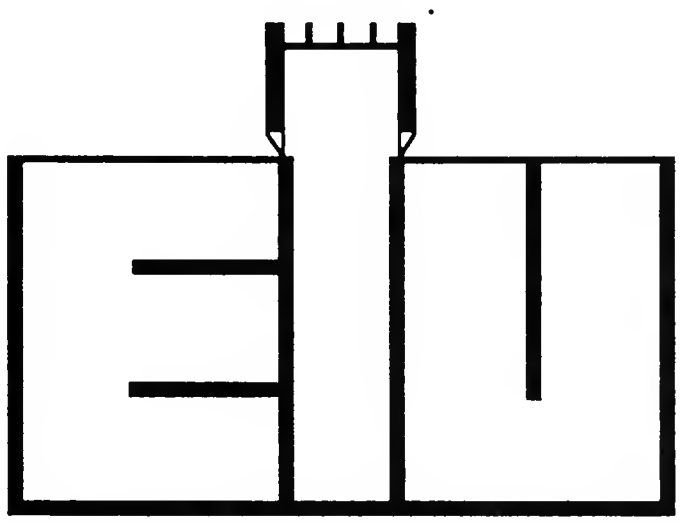
ILLINOIS STATE ACADEMY OF SCIENCE

88th Annual Meeting

SUSTAINING PLANET EARTH

OCTOBER 6-7, 1995



EASTERN ILLINOIS UNIVERSITY
CHARLESTON, ILLINOIS

Participants are urged to pre-register for the ISAS Annual Meeting by returning the enclosed Registration form with a payment of $25.00 for regular members or $15.00 for student members to Andrew Methven, Botany Department, Eastern Illinois University, Charleston, IL, 62440. Deadline for receipt of the pre-registration form is September 18, 1995. Tickets for the ISAS luncheon and dinner should be reserved when you pre-register and may be picked up at the Registration Table in the Eastern Illinois University Student Union on Thursday evening, October 5, or Friday, October 6, 1995.

On-site registration will be conducted during both days of the meeting for a fee of $35.00 for regular members and $20.00 for student members. Host institution students (ID card required) are invited to attend the oral paper sessions free of charge but must register as "student guests" and display their ISAS name tag.

All participants must register and have their ISAS name tag before they can participate in the ISAS meeting activities.

TRAVEL INFORMATION

Eastern Illinois University in Charleston, Illinois is accessible by car, train, or air. If traveling by car, refer to the maps of the Galesburg area provided elsewhere in this publication for the most direct route from your location to your motel and the ISAS meeting site. Air travel to Coles County Municipal Airport is possible, and Amtrak service is available to Mattoon, Illinois. If you plan to travel by air or by Amtrak, call the local organizers to make arrangements for local transport to your motel.

RECOMMENDED MOTELS

For ISAS members and guests, blocks of rooms have been reserved until August 31, 1995 at the following:

Varsity Inn, Charleston (217/348-8882)
Worthington Inn, Charleston (217/348-8161)
Fairfield Inn, Mattoon (217/234-2355)

Reserve your room early - although no other major events are scheduled for this weekend, hotel/motel accomodations in Charleston are limited. Be sure to mention the Illinois State Academy of Science when making reservations.

Other accomodations with convenient access to the meeting site are:

Econolodge, Charleston (217/345-7689)
Super 8 Motel, Mattoon (217/235-8888)
Ramada Inn, Mattoon (217/235-0313)

PARKING

Parking is available on the Eastern Illinois University campus in the O'Brien Stadium Lot (see enclosed campus map) for a fee of $2.00. Parking permits will be mailed to those who request them on the registration form.

PUBLIC ADDRESS

This address will be presented by Dr. Barry Noon in the Grand Ballroom at the Eastern Illinois University Student Union from 8:00 - 9:00 on Friday, October 6, 1995. The address is open to the public.

ILLINOIS STATE ACADEMY OF SCIENCE

88th Annual Meeting

SUSTAINING PLANET EARTH

OCTOBER 6-7, 1995

EASTERN ILLINOIS UNIVERSITY
CHARLESTON, ILLINOIS

****

PUBLIC ADDRESS

BY

Dr. Barry R. Noon
Acting Chief Scientist
National Biological Survey

Friday, October 6, 1995 - 8:00 p.m.
Grand Ballroom
Eastern Illinois University Student Union

Barry R. Noon is currently the Acting Chief Scientist for the National Biological Service (USDI), stationed in Washington, D.C. Prior to this appointment, from 1987-94 Dr. Noon served as Project Leader for the wildlife ecology research program at Redwood Sciences Laboratory, US Forest Service, Arcata, CA, and from 1981-87 as Associate Professor, Department of Wildlife, Humboldt State University, Arcata, CA. Dr. Noon did his undergraduate studies at Princeton University, and in 1977 received the Ph.D. degree in zoology from the State University of New York. Dr. Noon's areas of research include the population ecology of terrestrial vertebrates, conservation biology and planning, and the application of science to the resolution of natural resource problems. Recently, he has conducted population viability analyses for the northern and California spotted owls, and been involved in the development of long-term management plans for public lands in the Pacific Northwest. Dr. Noon has published over 70 papers and book chapters, and currently serves as an Associated Editor for the Journal of Wildlife Management.

ISAS ANNUAL MEETING MENUS
EASTERN ILLINOIS UNIVERSITY STUDENT UNION

LUNCHEON MENU - Friday, October 6, 11:30am

LUNCHEON BUFFET
Assorted condiments
Choice of Three Salads
Gourmet Deli Platter (Turkey, Roast Beef, Ham, Corned Beef)
Gourmet Cheese Platter (American, Cheddar, Swiss)
Assorted Bread Tray
Choice of Dessert
Coffee, Hot tea, Iced Tea

POSTER SESSION SOCIAL - Friday, October 6, 4:30pm

Wine and Cheese Reception

BANQUET MENU - Friday, October 6, 6:30pm

Choice of Entree:
A. Chicken Vesuvio (Boneless Chicken Breast Sauteed in Olive Oil, Garlic and Herbs)
B. Roast Loin of Pork

Tossed Salad Greens
Baked Idaho Potato
Glazed Carrots
Fruit or Cream Pie
Coffee, Hot tea, Iced Tea

SUMMARY OF EVENTS

Thursday, October 5, 1995

5:00 - 10:00pm — Registration, Lounge outside of Grand Ballroom

6:00 - 10:00pm — Council Dinner and Meeting, 1895 Room

Friday, October 6, 1995

7:30am - 5:00pm — Registration, Lounge outside of Grand Ballroom (Refreshments served)

8:30 - 11:30am — Paper Sessions, see program for session locations

10:00 - 10:30am — Break, Lounge outside of Grand Ballroom (Refreshments served)

11:30am - 1:00pm — ISAS Luncheon and Business Meeting - Grand Ballroom (entrance ticket required)

1:30 - 4:30pm — Paper Sessions, see program for session locations

3:00 - 3:30am — Break, Lounge outside of Grand Ballroom

4:30 - 6:30pm — Poster Session/Wine and Cheese Reception - University Ballroom (entrance ticket required)

6:30 - 8:00pm — ISAS Banquet - Grand Ballroom (entrance ticket required)

8:00 - 9:00pm — Public Address, Grand Ballroom

Saturday, October 7, 1995

7:30am - 11:00am — Registration, Lounge outside of Grand Ballroom (Refreshments served)

8:30 - 11:30am — Paper Sessions, see program for session locations

End of Meeting

ABSTRACTS

Abstracts of the Public Address, Paper Sessions, and Poster Session are included elsewhere in this publication.

OTHER SITES AND EVENTS

Various natural and historic sites are within a short drive of Charleston, including:

Fox Ridge State Park
Rocky Branch Nature Preserve
Lincoln Log Cabin State Historic Site
Shiloh Cemetary (burial place of Thomas Lincoln)
Coles County Fairgrounds (site of first Lincoln-Douglas debate)

Information will be available at the registration table.

QUESTIONS

If you have any questions concerning the 88th Annual Meeting of the Illinois State Academy of Science, please contact one of the local organizers listed below:

Andrew S. Methven
Botany Department
Eastern Illinois University
Charleston, IL 61920

Phone: 217/581-6241
FAX: 217/581-2722
e-mail: cfasm@eiu.edu

Charles L. Pederson
Botany Department
Eastern Illinois University
Charleston, IL 61920

Phone: 217/581-6239
FAX: 217/581-2722
e-mail: cfclp1@eiu.edu

PAPER SESSIONS

AGRICULTURE DIVISION

Division Chair:
Steven E. Kraft
Department of Agribusiness Economics
Southern Illinois University
Carbondale, IL 6290I

SESSION I - Friday, October 6 — PRESIDING: Steven Kraft

TIME	PAPER #	LOCATION: Kansas Room
8:30 AM	1	RELOCATION OF BRAZILIAN FARMING TO AVOID DAMAGE TO THE AMAZONIAN RAIN FOREST. R.N. Woll, N. Woll & Co., Inc., San Jose.
8:45 AM	2	MIDWESTERN FARMER'S FEELNGS ABOUT CONSERVATION COMPLIANCE; 1995. S.E. Kraft, Southern Illinois University, Carbondale and J.D.ESSEKS , Northern Illinois University, DeKalb.

BOTANY DIVISION

Division Chair:
Andrew S. Methven
Department of Botany
Eastern Illinois University
Charleston, IL 61920

SESSION I - Friday, October 6 — PRESIDING: Andrew Methven

TIME	PAPER #	LOCATION: Shelbyville Room
9:00 AM	3	TIMING OF GERMINATION AND SEEDLING SURVIVAL IN BOLTONIA DECURRENS, A THREATENED FLOODPLAIN SPECIES. S.Moss and M.Smith, Southern Illinois University, Edwardsville.

9:15 AM	4	CANOPY GAP COLONIZATION BY PAWPAW (*ASIMINA TRILOBA*) AS A FACTOR IN FOREST SUCCESSION IN SOUTHWESTERN ILLINOIS. S. Travelstead and K. Schulz Southern Illinois University, Edwardsville.
9:30 AM	5	SPATIAL PATTERN AND COMPETITION BETWEEN PAWPAW (*ASIMINA TRILOBA*) AND SUGAR MAPLE (*ACER SACCHARUM*) IN SOUTHWESTERN ILLINOIS. A.Luetkenhaus and K. Schulz, Southern Illinois University, Edwardsville.
9:45 AM	6	COMPARATIVE GROWTH CHARACTERISTICS OF PAWPAW (*ASIMINA TRILOBA*) AND SUGAR MAPLE (*ACER SACCHARUM*) IN UNDERSTORY LIGHT CONDITIONS. K.Biver, K.Glatz, K. Schulz, I. Husain, and A. Luetkenhaus, Southern Illinois University,Edwardsville.
10:00 AM		BREAK
10:15 AM	7	ANATOMY OF EOSPERMATOPTERIS ERIANA FROM THE UPPER MIDDLE DEVONIAN (=GIVETIAN) OF NEW YORK. J.S. Boyer,Jr., S.D.Klavins, and L.C.Matten, Southern Illinois University, Carbondale.
10:30 AM	8	GEOGRAPHIC INFLUENCES ON ILLINOIS TENSION ZONES. E.A. Corbett, R.C. Anderson, and G.F.Aspbury, Illinois State University, Normal.
10:45 AM	9	CHANGES IN SITE CHARACTERISTICS FOR A THREATENED, FUGIIVE FLOODPLAIN SPECIES,*BOLTONIA DECURRENS,* AS A RESULT OF THE FLOOD OF 1993. P.A.Mettler-McClure and M.Smith Southern Illinois University, Edwardsville.
11:00 AM	10	SYSTEMATICS OF LEPIOTA HUMEI (AGARICALES, BASIDIOMYCETES) AND RELATED SPECIES. B.P.Akers and W.J.Sundberg, Southern Illinois University, Carbondale.
11:30 AM		ISAS LUNCHEON AND BUSINESS MEETING
1:30 PM	11	PCR AMPLIFICATION OF nrDNA OF LEPIOTA SPP. (AGARICALES, BASIDIOMYCETES). B.P.Akes, D.A. Lightfoot, and W.J.Sundberg, Southern Illinois University, Carbondale.

1:45 PM 12 IN SITU PREPOLLEN OF TELANGIUM SCHWEITZERI MATTEN AND FINE. S.D. Klavins and L.C. Matten, Southern Illinois University, Carbondale.

2:00 PM 13 AN ASSESSMENT OF THE MYCORRHIZAL FUNGAL STATUS OF WETLAND PLANT SPECIES. S.D. Turner and C.F. Friese, University of Dayton, Dayton, Ohio.

2:15 PM 14 PALEOLIMNOLOGY OF CROOKED LAKE, MICHIGAN. K. K.McKeever, S.McCance, C.Sesvold, and R. Brugam, Southern Illinois University, Edwardsville.

2:30 PM BREAK

2:45 PM 15 VARIATION IN TANNIN PRODUCTION IN POPULATIONS OF MEXICAN *ACACIA* SPECIES. K.E.Readel, D.S.Seigler, J.E.Ebinger, and H.D. Clarke, University of Illinois, Urbana.

3:00 PM 16 VEGETATION-SUBSTRATE RELATIONSHIPS OF A SANDSTONE OUTCROP ALONG THE OHIO RIVER IN HARDIN COUNTY, ILLINOIS. M.A. Basinger, S.B.Franklin and J.P. Shimp, Southern Illinois University, Carbondale.

3:15 PM 17 POST-GLACIAL VEGETATION RECORD FROM A PEAT BOG IN THE UPPER PENINSULA OF MICHIGAN. B.Owen and R.Brugam, Southern Illinois University, Edwardsville.

3:30 PM **BOTANY DIVISION BUSINESS MEETING**

SESSION II - Friday, October 6 LOCATION: Sullivan Room

9:00 AM 18 SEASONAL PATTERNS IN THE EFFECT OF THE INVASIVE EXOTIC *VINCA MINOR* ON THE UNDERSTORY OF KNOBELOCH NATURE PRESERVE, A SOUTHWESTERN ILLINOIS MESIC FOREST. K.Schulz and C.Thelen, Southern Illinois University, Edwardsville.

9:15 AM 19 LITTER DECOMPOSITION IN COAL SLURRY PONDS. J.Taylor and B.Middleton, Southern Illinois University, Carbondale.

9:30 AM 20 VEGETATION OF TEMPORARY SAND PONDS OF THE ILLINOIS RIVER SAND AREA SECTION. W.E. McClain, Illinois Department of Conservation, Springfield, R.D. McClain, Auburn High School, Auburn, and J.E.Ebinger, Eastern Illinois University, Charleston.

9:45 AM 21 EFFECT OF SEED MASS AND MORPHOLOGY ON GERMINATION IN A THREATENED,FUGITIVE FLOODPLAIN SPECIES, *BOLTONIA DECURRENS*. J.Cawly, G.Hagler and M.Smith, Southern Illinois University, Edwardsville.

10:00 AM BREAK

10:15 AM 22 GROWTH, STOMATAL CONDUCTANCE AND FLUORESCENCE RESPONSES TO ROOT-ZONE SATURATION IN A THREATENED FLOODPLAIN SPECIES,BOLTONIA DECURRENS, COMPARED TO THREE COMPETITORS. M.Smith and S. Moss, Southern Illinois University, Edwardsville.

10:30 AM 23 EFFECT OF FIRE ON SANDHILL HERBS: NATRIENTS,MYCORRHIZAE, AND BIOMASS ALLOCATION. R.C.Anderson, Illinois State University, Normal and E.S.Menges, Archbold Biological Station, Lake Placid, Florida.

10:45 AM 24 THE EFFECT OF ARGICULTURE ON THE SEED BANKS OF THE AMERICAN BOTTOMS FLOODPLAIN OF THE MISSISSIPPI RIVER. C.P. Giedeman and B.A. Middleton, Southern Illinois University, Carbondale.

11:00 AM 25 A NEW MEMBER OF THE PSEUDOSPOROCHNALES FROM THE UPPER MIDDLE DEVONIAN GILBOA FLORA OF NEW YORK STATE. L.C.Matten, J.S.Boyer, Jr., R.A. Gastaldo, S.D.Klavins, B.A.Roy, and W.R.Tanner, Southern Illinois University, Carbondale.

11:30 AM ISAS LUNCHEON AND BUSINESS MEETING

1:30 PM	26	CYPRESS SEED GERMINATION IN RELATION TO SOIL MOISTURE AND TEMPERATURE ALONG THE CACHE RIVER, SOUTHERN ILLINOIS. P.M. Villeda, DePaul University, Chicago and B.A.Middleton, and H.Harris, Southern Illinois University, Carbondale.
1:45 PM	27	RESPONSE OF SOIL REDOX POTENTIAL TO CHANGES IN DEPTH TO WATER TABLE AND SOIL OXYGEN CONTENT. K.E.Fessel, Southern Illinois University, Carbondale, and R.P. Gambrell, Louisiana Stat Univesity, Baton Rouge, Louisiana.
2:00 PM	28	SEED BANKS OF CYPRESS SWAMPS IN THE CACHE RIVER REGION. B.A.Middleton, Southern Illinois University, Carbondale.
2:15 PM	29	HIGHER LEVEL INFLORESCENCES IN THE ASTERACEAE--A WIDESPREAD PHENOMENON. E.M. Harris, Eastern Illinois University, Charleston.
2:30 PM		BREAK
2:45 PM	30	EFFECTS OF OZONE ON SOYBEAN SEED VIGOR. K.A. Gerlach and J.M. Coons, Eastern Illinois University, Charleston.
3:00 PM	31	LICHEN USE BY LARVAL *LEUCOCHRYSA PAVIDA* (NEUROPTERA: CHRYSOPIDAE). P.J.Wilson and A.S.Methven, Eastern Illinois University, Charleston.
3:30 PM		**BOTANY DIVISION BUSINESS MEETING**

CELL, MOLECULAR & DEVELOPMENTAL BIOLOGY DIVISION

Division Chair:
Paul Wanda
Department of Biological Sciences
Southern Illinois University
Edwardsville, IL 62025

SESSION I - Friday, October 6 — PRESIDING: Paul Wanda

LOCATION: Effingham Room

TIME	PAPER #	
9:00 AM	32	THE HEAT SHOCK RSPONSE OF COOL-INCUBATED BARLEY ALEURONE LAYERS. J. Duckworth and M.R. Brodl, Knox College, Galesburg.
9:15 AM	33	THE HEAT SHOCK RESPONSE OF WARM-INCUBATED BARLEY ALEURONE LAYERS. A. Shaw and M.R.Brodl, Knox College, Galesburg.
9:30 AM	34	THE CONSTRUCTION OF BINARY VECTORS CONTAINING THE cDNAs CODING FOR HUMAN FIBRINOGEN. P. Vordtriede, J.Hensley, and M. Bolyard, Southern Illinois University, Edwardsville.
9:45 AM	35	AN IMPROVED METHOD FOR PURIFICATION OF CERATO-ULMIN. A.K.Gundlach, K.R.Diel, and M.G. Brodl, Southern Illinois University, Edwardsville.
10:00 AM	36	rDNA SEQUENCE FOR IDENTIFICATION OF CRYPTIC SPECIES OF MALARIA VECTORS IN SOUTH AMERICA. G.N.Fritz, Eastern Illinois University, Charleston.
10:15 AM	37	THE IDENTIFICATION OF CRYPTIC SPECIES OF MALARIA VECTORS IN SOUTH AMERICA USING DOT BLOTS AND POLYMERASE CHAIN REACTION. G.N. Fritz, and S.J.Engman, Eastern Illinois University, Charleston.
10:30 AM	38	COPPER MODULATES NITRIC OXIDE PRODUCTION IN THE MURINE MACROPHAGE CELL LINE RAW 264.7.

B.E.Wilson, J.Davidson, and S.Fan, Bradley University, Peoria.

10:45 AM 39 DNA TRANSFORMATION OF GERMINATED *TAXUS BREVIFOLIA* EMBRYOS. E.C.Luan and M.G. Bolyard, Southern Illinois University, Edwardsville.

11:30 AM ISAS LUNCHEON AND BUSINESS MEETING

1:30 PM 40 EFFECTS ON MICROTUBULE-ASSOCIATED PROTEINS (MAPs) BY PHOSPHATASE INHIBITION. S. Karst and P.Wanda, Southern Illinois University, Edwardsville.

1:45 PM 41 MOLECULAR STUDIES ON A CLASS OF CALCIUM-BINDING PROTEINS IN *VORTICELLA*. J.J.Maciejewski, E.J. Vacchiano and H.E.Buhse, Jr., University of Illinois, Chicago.

2:00 PM 42 A NOVEL METHOD USING CALCIUM PHOSPHATE (MONOBASIC) AND LOW pH FOR MASS INDUCTION OF TELOTROCHS IN THE CILIATED PROTOZOAN VORTICELLA CONCALLARIA. P.J. DeBaufer, S.C.Pak, T.Lopez, C.Yang, A.Amin and H.E.Buhse, Jr., University of Illinois, Chicago.

2:15PM 43 ARE URNS FROM DIFFERENT SIPUNCULAN GENERA FUNCTIONALLY SIMILAR? A COMPARISON OF THE URNS OF *PHASCOLOSOMA PERLUCENS* WITH THOSE OF *SIPUNCULUS NUDUS* (PHYLUM SIPUNCULA). T.Veith, N. Gruchala and L.K.Dybas, Knox College, Galesburg.

2:30 PM 44 A COMPARISON OF THE HEAT STRESS TO THE HEAT SHOCK RESPONSE IN THE SIPUNCULAN WORM, *PHASCOLOSOMA PERLUCENS*. N. Gruchala, T.Veith and L.K. Dybas, Knox College, Galesburg.

2:45 PM 45 THE EFFECTS OF HEAT SHOCK ON THE SYNTHESIS OF BARLEY LECTIN IN TRANSGENIC TOBACCO. S.Gormley and M.R.Brodl, Knox College, Galesburg.

3:00 PM BREAK

3:15 PM 46 THE HEAT SHOCK RESPONSE OF BARLEY ALWURONE LAYERS INCUBATED IN THE PRESENCE OF

GIBBERELLIC ACID AND ABSCISIC ACID. C.E.Katholi and M.R. Brodl, Knox College, Galesburg.

3:30 PM 47 MESSENGER RNA STABILITY AND MEMBRANE PHOSPHOLIPID COMPOSITION IN HEAT STRESSED BARLEY ALEURONE CELLS. P.A.S.Benson and M.R.Brodl, Knox College, Galesburg.

3:45 PM 48 THE HEAT SHOCK RESPONSE OF STYLE TRANSMITTING TISSUE IN PETUNIA. K.A. Parsons and M.R.Brodl, Knox College, Galesburg.

CHEMISTRY DIVISION

DIVISION CHAIR:
Brad Andersh
Department of Chemistry
Bradley University
Peoria, IL 61625

SESSION I - Friday, October 6 PRESIDING: Brad Andersh

TIME PAPER # LOCATION: Charleston Room

1:30 PM 49 EPSTEIN-BARR VIRUS: THE ROLE OF CD 45 IN LYMPHOMA DEVELOPMENT. A.Adukia, Illinois Mathematics and Science Academy, Aurora.

1:45 PM 50 METHYLATED ANALOGS AS POTENTIAL SUBSTRATES FOR COPROPORPHYRINOGEN OXIDASE. T.A.Kaprak, L.Shen, T.D.Lash, and M.A.Jones, Illinois State University, Normal.

2:00 PM 51 SUBSTRATE SPECIFICITY OF MALATE DEHYDROGENASE. J.A.Rardin, S.K.Wright, M.Sherman, A.Adukia, K.Hughes and N.C.Furumo, Eastern Illinois University, Charleston.

2:15 PM 52 SONOCHEMICAL REACTIONS OF NITRITE. M.K.Peterson and E.B.Flint, Bradley University, Peoria.

2:30 PM	53	SYNTHESIS OF THE FIRST FULLY AROMATIC PORPHYRIN ANALOGS WITH BENZENE OR PYRIDINE SUBUNITS. S.Chaney and T.D.Lash, Illinois State University,Normal.
2:45 PM	54	THE SYNTHESIS OF a-DICARBONYL MONO- AND DIOXIMES AND CONJUGATED ANALOGS. K.J.Steenberg, P.Kovacic, B.J.Andersh and K.W.Field, Bradley University, Peoria.
3:00 PM		BREAK
3:15 PM	55	SYNTHESIS OF ACENAPHTHOPORPHYRINS. P.Chandrasekar and T.D.Lash, Illinois State University, Normal.
3:30 PM	56	FREE RADICAL ADDITION REACTIONS OF 2,4-PENTADIENYLTRIBUTYLTIN. A.Fernandez and B.Andersh, Bradley University, Peoria.
3:45 PM	57	FRIEDEL-CRAFTS ALKYLATION: AN EXPERIMENT ILLUSTRATING SEVERAL REACTION PARAMETERS. K.D.Erlinder, K.E.Kolb and K.W.Field, Bradley University, Peoria.
4:00 PM	58	ACETONE: AN ALTERNATIVE SOLVENT FOR BROMINATIONS. D.Murphy, R.Olson, K.Field, and B.Andesh, Bradley University, Peoria.

COMPUTER SCIENCE DIVISION

DIVISION CHAIR:
Lee H. Tichenor
Department of Computer Science
Western Illinois University
Macomb, IL 6l455

SESSION I - Friday, October 6

PRESIDING: Lee Tichenor

TIME PAPER #

LOCATION: Arcola Room

1:30 PM 59 CONVOLUTION PRODUCTS AND COMPOSITION ALGEBRAS. P.J.C.Lamont, Western Illinois University, Macomb.

1:45 PM 60 AUTOMATED IMPLEMENTATION OF SIMPLEX ALGORITHM USING SPREADSHEET. S.Dey, Parks College, Cahokia.

2:00 PM 61 FUZZIFYING THE BACKPROPAGATION MODEL. C.J. Gale, Western Illinois University, Macomb.

2:15 PM 62 A YEAR LONG COURSE IN SOFTWARE ENGINEERING: OUR EXPERIENCE. A.M.Abunawass, Western Illinois University, Macomb and T.G.Fisher and A.Schoenberger, Saint Cloud State University, Saint Cloud, Minnesota.

2:30 PM 63 A CASE STUDY IN OBJECT-ORIENTED PROGRAMMING. A. Dayama, A.M.Abunawass and L.Leff, Western Illinois University, Macomb.

2:45 PM BREAK

3:15 PM 64 A SCHEDULING EXPERT SYSTEM FOR ASSIGNING STUDENT LAB ASSISTANTS TO ACADEMIC COMPUTING LABS. O.Gottwald, H.Soegiyono, D.Pomatto, A.Abunawass and L.Leff, Western Illinois University, Macomb.

3:30 PM 65 USING GENETIC ALGORITHM TO LAYOUT PATTERNS ON MATERIAL FOR THE GOLF-BAG INDUSTRY. R.P. Chiew, L.L.Leff, and A.M.Abunawass, Westen Illinois University, Macomb and R.J.Flynn, Polytechnic Institute of New York, Brooklyn, New York.

3:45 PM 66 AN EXPERT SYSTEM TO USE THE ELLIOT WAVE FOR FUTURE'S PRICING. O.Gottwald and L. Leff, Western Illinois University, Macomb.

4:00 PM 67 NASA'S CASEA SIMULATION ENVIRONMENT AND A PROPOSED PC BASED VERSION. L.H.Tichenor and M.A.Edeen, Western Illinois University, Macomb, and Johnson Space Center, Houston, Texas.

4:15 PM DIVISION BUSINESS MEETING

EARTH SCIENCE DIVISION

DIVISION CHAIR:
Richard L. Leary
Division of Geology
Illinois State Museum
Springfield, IL 62706

SESSION I - Friday, October 6 — PRESIDING: Richard Leary

TIME — PAPER # — LOCATION: Kansas Room

2:00 PM 68 PRELIMINARY RESULTS OF A COAL CONVERSION FACILITY ON AMBIENT AIR QUALITY IN CHARLESTON, ILLINOIS. S.Rundle and V.P.Gutowski, Eastern Illinois University, Charleston.

2:15 PM 69 LAKESHORE RESTORATION USING ENHANCED SHORELINE VEGETATIVE TECHNIQUES. V.P.Gutowski, A.Alford and M.I.Czako, Eastern Illinois University, Charleston.

2:30 PM 70 LIQUEFACTION FEATURES AS EVIDENCE OF PREHISTORIC EARTHQUAKES. W.E.McNulty, Eastern Illinois University, Charleston.

2:45 PM 71 VENATION PATTERNS IN SOME EARLY *GLOSSOPTERIS*. R.L.Leary, Illinois State Museum, Springfield.

3:00PM 72 METEORITES FROM MARS: THE CONTROVERSY CONTINUES. T.W.Boomer and C.T.Ledvina, Northeastern Illinois University, Chicago and P.P.Sipiera, Harper College, Palatine.

ENGINEERING AND TECHNOLOGY DIVISION

DIVISION CHAIR:
Constantine J. Hatziadoniu
Department of Electrical Engineering
College of Engineering & Technology
Southern Illinois University
Carbondale, IL 6290I

SESSION I - Friday, October 6 — PRESIDING: C.J. Hatziadoniu

TIME	PAPER #	LOCATION: Kansas Room
1:30 PM	73	NEW TECHNIQUES IN LIQUID CRYSTAL THERMOGRAPHY APPLICATIONS. M.R.Kulkarni and R.P.Brady, Southern Illinois University, Carbondale.

ENVIRONMENTAL SCIENCE DIVISION

DIVISION CHAIR:
James R. Rastorfer
Department of Biological Sciences
Chicago State University
Chicago, IL 60628

SESSION I - Friday, October 6 — PRESIDING: James Rastorfer

TIME	PAPER #	LOCATION: Kansas Room
9:45 AM		CALL DIVISION TO ORDER AND ANNOUNCEMENTS
10:00 AM	74	WATER QUALITY IN THE GRAND POINT CREEK WATERSHED, WASHINGTON AND CLINTON COUNTIES, ILLINOIS: EFFECTS OF OIL-FIELD ACTIVITIES. D.Ralston, C.Campbell, and A.Stueber, Southern Illinois University, Edwardsville.
10:15 AM	75	WATERSHED MONITORING FOR NITRATE VARIABILITY IN THE VERMILION RIVER WATERSHED. D.R.Mayer and L.L.Keefer, Illinois StateWater Survey, Champaign.

10:30 AM	76	LAND REHABILITATION OF THE MCKENNA HILL DROP ZONE, FORT BENNING, GEORGIA: SURVEY OF THE SPONTANEOUS VEGETATION. J.R.Rastorfer, Chicago State University, Chicago and S.D.Zellmer, Argonne National Laboratory, Argonne.
10:45 AM		DIVISION BUSINESS MEETING

HEALTH SCIENCES DIVISION

DIVISION CHAIR:
Dennis J. Kitz
Department of Biological Sciences
Southern Illinois University
Edwardsville, IL 62026

SESSION I - Friday, October 6 — PRESIDING: Dennis Kitz

LOCATION: Mattoon Room

TIME	PAPER #	
9:00 AM	77	THE INCIDENCE OF THE LYME DISEASE SPIROCHETE, BORRELIA BURGDORFERI, IN TICK VECTORS OF MISSOURI AND ILLINOIS. I.Bruno and C.Santanello, Southern Illinois University, Edwardsville.
9:15 AM	78	CONSPECIFICITY OF LYME DISEASE TICK VECTORS OF THE GENUS IXODES. J.Mehranfar and C.Santanello, Southern Illinois University, Edwardsville.
9:30 AM	79	A NEW METHOD TO OBTAIN FIBRIN-PLATELET MATRICES IN THE CONTINUED STUDY OF CANDIDAL ENDOCARDITIS. M.E.Parks and D.J.Kitz, Southern Illinois University, Edwardsville.
9:45 AM	80	HOST IMMUNE RESPONSE AND FUNGICIDAL ACTIVITY CAN BE EFFECTED BY MACROLIDE ANTIBIOTICS. D.J.Ufert, A.Spray and D.J.Kitz, Southrn Illinois Univesity, Edwardsville.

10:00 AM 81 EFFECT OF THE SOMATOTROPIC AXIS ON TESTICULAR STEROIDOGENESIS IN HAMSTERS. S.S.Oh, R.Khardori and A.G.Amador, Southern Illinois University School of Medicine, Springfield.

10:15 AM 82 THE OPINION OF HIGH SCHOOL STUDENTS ON HEALTH CARE BENEFITS FOR THE FUTURE. M.C.Perrson,Jr. and A.G.Amador, Southern Illinois University School of Medicine, Springfield.

10:30 AM 83 PUBLIC OPINION OF HEALTH CARE BENEFITS FOR THE FUTURE. M.C.Perrson,Jr., S.J.Verhulst and A.G.Amador, Southern Illinois University School of Medicine, Springfield.

10:45 AM 84 A HEALTH CARE PLAN FOR UNIVERSAL COVERAGE IN ILLINOIS. A.G.Amador and M.C.Perron,Jr., Southern Illinois University School of Medicine, Springfield.

11:00 AM 85 QUANTITATIVE MEASUREMENTS IN BIOLOGICAL TRANSMISSION ELECTRON MICROSCOPY. L.D.Spears, John A. Logan Community College, Carterville.

MICROBIOLOGY DIVISION

DIVISION CHAIR:
Amrik S. Dhaliwal
Department of Biology
Loyola University
Chicago, IL 60626

SESSION I - Friday, October 6 PRSIDING: Amrik Dhaliwal

TIME PAPER # LOCATION: Arcola Room

8:45 AM 86 EFFECTS OF THE EXTRACT OF ALLIUM CEPA ON THE INFECTIVITY AND MORPHOLOGY OF TOBACCO MOSAIC VIRUSES (TMV). M.Miszcak, K.Issa, A.S.Dhailwal and W.Jones, Loyola University, Chicago.

9:00 AM 87 THE DETERMINATION OF THE MECHANISM(S) OF BACTERIAL BIOLOGICAL CONTROL OF FUSARIUM DRY ROT. M.L.Chase and M.J.Boehm, Monmouth College, Monmouth and D.A.Schisler, USDA-ARS National Center for Agricultural Utilization Research, Peoria.

9:15 AM 88 EFFECTS OF TWO NEMATODE PARASITES ON THE BEHAVIOR OF MICE (MUS MUSCULUS). K.E. Barger and K.L.Cramer, Monmouth College, Monmouth.

9:30 AM 89 EFFECT OF DIFLUBENZURON ON GROWTH AND CHITIN CONTENT OF TWO ZYGOMYCETS. T.Dubey, University of Wisconsin, Madison, Wisconsin.

9:45 AM 90 STUDIES OF ZINGIBER OFFICINALE EXTRACT TREATED CYANOBACTERIA WITH SCANNING ELECTRON MICROSCOPE AND ITS SUSCEPTIBILITY TO CYANOPHAGE INFECTION. S.Khan, A.S.Dhaliwal, and W.Jones, Loyola University, Chicago.

10:00 AM 91 SCANNING ELECTRON MICROCOPY OF CYANOBACTERIA TREATED WITH THE EXTRACT OF ALLIUM CEPA AND ITS SUSCEPTIBILITY TO CYANOPHAGE LPP-I INFECTION. A.Valika, A.S.Dhaliwal and W.Jones, Loyola University, Chicago.

10:15 AM BREAK

10:30 AM 92 MORPHOLOGICAL AND INFECTIVITY STUDIES OF CYANOPHAGE LPP-I TREATED WITH THE EXTRACT OF ALLIUM CEPA. A.Musabji, A.S.Dhaliwal, and W.Jones, Loyola University, Chicago.

10:45 AM 93 ELECTRON MICROSCOPY AND INFECTIVITY STUDIES OF CYANOPHAGE LPP-I TREATED WITH EXTRACTS OF ZINGIBER OFFICINALE. H.Yehya, A.S.Dhaliwal, and W.Jones, Loyola University, Chicago.

11:00 AM 94 EFFECTS OF THE EXTRACT OF ALLIUM SATIVUM ON THE MORPHOLOGY AND INFECTIVITY OF CYANOPHAGE LPP-I. A.Hashmi, A.S.Dhaliwal, and W.Jones, Loyola University, Chicago.

11:15 AM 95 STUDIES OF THE CHANGES IN CYANOBACTERIUM TREATED WITH THE EXTRACT OF ALLIAM SATIVUM AND ITS SUSCEPTIBILITY TO CYANOPHAGE LPP-I. S.Ali, A.S.Dhaliwal, and W.Jones, Loyola University, Chicago.

SCIENCE, MATHEMATICS AND TECHNOLOGY EDUCATION DIVISION

DIVISION CHAIR:
Neil R. Smalheiser
Department of Pediatrics
University of Chicago
Chicago, IL 60637

SESSION I - Friday, October 6 PRESIDING: Neil Smalheiser

TIME PAPER # LOCATION: Mattoon Room

1:30 PM 96 ALZHEIMER'S DISEASE: A LIGHTNING ROD FOR SCIENCE EDUCATION. N.R.Smalheiser, University of Chicago, Chicago.

1:45 PM 97 TEACHING CONSERVATION IN SCIENCE, MATH, AND TECHNOLOGY CLASSROOMS. R.N.Woll and S.J.Cryder, N. Woll & Co., Inc., San Jose.

2:00 PM 98 DEVELOPING INTEREST IN SCIENE THROUGH SUMMER OUTDOOR ACTIVITY. M.L. Wilson-Comer, Chicago State University, Chicago.

2:15 PM 99 AGE STRUCTURE AND SURVIVORSHIP IN A LARGE MAMMAL: USING LIFE TABLES CONSTRUCTED FROM CEMETERY DATA TO TEACH BIOLOGY AND LOCAL HISTORY. J.Capelle, Wood River-East Alton Community High School, Wood River, and M.Smith, Southrn Illinois University, Edwardsville.

2:30 PM 100 THE IMPACT OF A COMMERCIALLY PREPARED SCIENCE PROGRAM ON ELEMENTARY SCHOOL DISTRICTS. J.A.McGaughey, Eastern Illinois University, Charleston.

2:45 PM 101 GENDER BIAS IN EDUCATIONAL SOFTWARE: A CONTENT ANALYSIS OF SEX-ROLE STEREOTYPES. E.M.AbuSharbain, Southern Illinois University, Edwardsville.

ZOOLOGY DIVISION

DIVISION CHAIR:
Dianne M. Jedlicka
Department of Biological Sciences
Augustana College
Rock Island, IL 61201

SESSION I - Friday, October 6 PRESIDING: Dianne Jedlicka

TIME PAPER # LOCATION: Charleston Room

8:30 AM 102 ECOLOGY, REPRODUCTION AND DEVELOPMENT OF OXYPORUS MAJOR GRAVENHORST, WITH A COMPARISON TO OTHER SPECIES OF OXYPORUS (COLEOPTERA: STAPHYLINIDAE). M.A.Goodrich, Eastern Illinois Universiy, Charleston.

8:45 AM 103 THE BRACHIACANTHA (COLEOPTERA: COCCINELLIDAE) OF ILLINOIS. H.W.Montgomery and M.A.Goodrich, Eastern Illinois University, Charleston.

9:00 AM 104 FLUCTUATION OF MICROARTHROPODS IN FLOODPLAIN AND NONFLOODED SOILS. M.J.Morrisey and G.Wittig, Southern Illinois University, Edwardsville.

9:15 AM 105 CONSTRAINT LINE THEORY AND SPECIATION. J.L.Kriz and D.M.Jedlicka, Joliet Junior College, Joliet and Augustana College, Rock Island,

9:45 AM BREAK

10:00 AM 106 THE EFFECT OF PATERNAL INVESTMENT ON AGING MALE GIANT WATERBUGS (Belostoma flumineum). K.C.Kruse and M.R.Gilg, Eastern Illinois University,Charleston.

10:15 AM 107 REPRODUCTION AND EARLY LIFE HISTORY OF *PIPA PARVA* IN CAPTIVITY. D.L.Plunk and J.E.Thomerson, Southern Illinois University, Edwardsville.

10:30 AM 108 THE CODEVELOPMENT OF SKULL DERMAL BONE AND LATERAL LINE CANALS IN THE ALEWIFE (*ALOSA PSEUDOHARENGUS*). J.D.Ricken, Loyola University, Chicago.

10:45 AM DIVISION BUSINESS MEETING

POSTER SESSION

Friday, October 6
4:30 - 6:30 PM

Eastern Illinois University
University Ballroom

POSTER #

109 MOVEMENT PATHWAYS OF GRASSHOPPERS AND HERMIT CRABS IN VEGETATED AND NON-VEGETATED AREAS IN COSTA RICA USING FRACTAL ANALYSIS. H.Kaneko, B.A.Middleton, T.Nakashima, and M.McKernan, Southern Illinois University, Carbondale.

110 THE RELATIONSHIP OF EPIPHYTE LOAD, TREE SPECIES AND DISTANCE FROM COAST IN COSTA RICA. T.Nakashima, B.Middleton, H.Kaneko, and M.McKernan, Southern Illinois University, Carbondale.

111 SYZYGITES MEGALOCARPUS (ZYGOMYCETES, MUCORALES, MUCORACEAE) IN ILLINOIS. R.L.Kovacs and W.J.Sundberg, Southern Illinois University, Carbondale.

112 THE LICHEN FLORA OF PUTNAM COUNTY, ILLINOIS. R.D.Hyerczyk, The Nature Conservancy, Chicago.

113 SUCCESSIONAL PATTERNS IN TWO CENTRAL ILLINOIS OAK FORESTS AFTER SEVENTEEN YEARS. D.J.Gustafson, M.M. Woodby, and R.C. Anderson, Illinois State University, Normal.

114 TRANSGLUTAMINASE ACTIVITY IN VERTEBRATE EYE TISSUE. A.Baich and J.Powell, Southern Illinois University, Edwardsville.

115 POLY ADP-RIBOSE POLYMERASE IN CHICK PIGMENT EPITHELIUM. A.Baich and M.Mitchell, Southern Illinois University, Edwardsville.

116 INSIGHTS ON THE SECRETORY PATHWAY OF STALK COMPONENTS IN *VORTICELLA CONVALLARIA*. A.A.Amin and H.E.Buhse, Jr., University of Illinois, Chicago.

117 SYNTHESIS AND CUSTOMIZATION OF 9-CROWN-3, 10-CROWN-3, 11-CROWN-3, AND 12-CROWN-3 CROWN ETHERS AND THEIR SPECIFIC COMPLEXATION WITH SMALL METAL CATIONS, DEPENDENT UPON DIFFERENT AZA- AND THIA-HETEROATOMIC COMPLEXES. B.Brower and D.Armstrong, Olivet Nazarene University, Kankakee.

118 GASTROPODS FOUND AT THE FARMDALIAN/WOODFORDIAN TRANSITION IN EAST-CENTRAL ILLINOIS. A..L.Clark and V.P.Gutowski, Easten Illinois University, Charleston.

119 A RAT MODEL OF CONTRACTURE AFTER THERAPY. K.Adams, C.Cox, J.DalPonte, L.House, K.Hummel, and B.Miller, Eastern Illinois University, Charleston.

120 ISSUES IN HUMAN GENETICS: STUDENT ATTITUDES. J.M.James, Eastern Illinois University, Charleston and J.F.Smith, Southern Illinois University, Carbondale.

121 A LAB EXERCISE IN HUMAN PHYSIOLOGY: BLOOD PRESSURES IN THE LOWER EXTREMITIES. J.H.Becker, Scholl College of Podiatric Medicine, Chicago.

122 LONG-TERM TRENDS (1959-1994) IN FISH POPULATIONS OF THE ILLINOIS RIVER. T.V.Lerczak, R.E.Sparks, and K.D.Blodgett, Illinois Natural History Survey, Havana.

123 EASTERN WOODRAT POPULATIONS IN SOUTHERN ILLINOIS. R.E.Wagle, A.M.Monty, and G.A.Feldhamer, Southern Illinois University, Carbondale.

124 THE EFFECTS OF SCENT TRAILS ON THE COMMON HOUSE CRICKET, ACHETA DOMESTICA. J.Stasica, Millikin University, Decatur.

125 LABORATORY ANIMAL CATALOGS OF GENES OF INTEREST IN ENDOCRILOGY AND REPRODUCTION. A.G.Amador, SIU School of Medicine, Springfield.

126 FARM ANIMAL CATALOGS OF GENES OF INTEREST IN ENDOCRILOGY AND REPRODUCTION. A.G.Amador and R.H.King, SIU School of Medicine, Springfield.

127 DETERMINATION OF BAT SPECIES THAT FORAGE AT A STREETLIGHT IN KANKAKEE DURING NOVEMBER. B.Brower, Olivet Nazarene University, Kankakee.

128 GREEN RIVER STATE WILDLIFE AREA AND MARGINAL ANALYSIS. J.L.Kriz and D.M.Jedlicka, Joliet Junior College, Joliet and Augustana College, Rock Island.

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ABSTRACTS

1

RELOCATION OF BRAZILIAN FARMING ACTIVITY TO AVOID DAMAGE TO THE AMAZONIAN RAIN FOREST. R.N. Woll, N. Woll & Co., Inc., San Jose, IL 62682. In an earlier development effort the World Bank financed roads and infrastructure development in the western "Amazon" area of Brazil. A disastrous result followed. Recovery is slow and damage will not be totally reversed. This paper describes a plan to re-locate farmers and ranchers to more agriculturally suited venues and outlines an economic strategy and incentives which will be advantageous to all parties concerned. Additionally, certain details will be outlined to facilitate agronomic recovery.

2

MIDWESTERN FARMERS FEELINGS ABOUT CONSERVATION COMPLIANCE: 1995. S.E. Kraft Southern Illinois University, Carbondale, IL 62901-4410 and J.D. Esseks, Northern Illinois University, DeKalb, IL 60115. During January and February 1995 1000 midwestern farmers with Conservation Compliance plans were surveyed. The results indicate that there is wide support for the program. In light of the 1995 farm bill debate, respondents were asked if they would continue with their plans if payments for USDA programs were cut by 50%, 25%, or 10%. Respondnets indicated that in the face of 50% cuts that 60% of them would continue with their plans. The percentage increases to 81% given a 10% in benefits. There was a reduction in the percentage of farmers who believed there was a high likelihood of being found out of compliance. This has implications for the future enforcement of the program.

3

TIMING OF GERMINATION AND SEEDLING SURVIVAL IN *BOLTONIA DECURRENS*, A THREATENED FLOODPLAIN SPECIES. Scott Moss and Marian Smith. Southern Illinois University Edwardsville. Edwardsville, IL 62026. *Boltonia decurrens* (Torr. & Gray) Wood (Asteraceae) is a member of the early successional communities adjacent the Illinois and Mississippi Rivers. *B. decurrens* colonizes the first year after a disturbance, but is replaced within 3-5 years. Seeds germinate continuously throughout the winter months (Dec. - Mar.), but the bulk of germination is in the early spring. However, the relative importance of winter and spring germination to the establishment of this species has not been determined. Seedling germination was recorded on nine 0.25 m^2 quadrats in a controlled field study and four 0.25 m^2 quadrats in a naturally occurring population. Germination and mortality were recorded weekly in the control and monthly in the field. 18.4% of germination occurred prior to March 10 (the last hard freeze), but mortality was 97% among these winter seedlings compared to 21% for spring seedlings. A separate lab experiment determined the optimal temperature for germination to be between 9 and 12°C. Knowledge of the optimal window for germination and seedling establishment is valuable to future demographic studies and management of this species.

4

CANOPY GAP COLONIZATION BY PAWPAW (*ASIMINA TRILOBA*) AS A FACTOR IN FOREST SUCCESSION IN SOUTHWESTERN ILLINOIS. Suzanne Travelstead and Kurt Schulz. Southern Illinois University at Edwardsville, Edwardsville, IL 62026-1651. Pawpaw is extraordinarily abundant in the understory of closed, mesic successional forests on the SIUE campus and elsewhere in the region. We evaluated the role of canopy gap formation in the proliferation of pawpaw, as opposed to sugar maple-- its primary competitor and a key canopy species. Transects placed through canopy gaps of varying ages show that pawpaw often proliferates abundantly within single tree gaps, producing populations with a mound-shaped height profile. Maple seedlings are scarce within gaps. The pulse of pawpaw recruitment plays a significant role in forest process, continuing to enforce low light conditions on the understory for a long period and suppressing tree growth. Given rapid rates of canopy tree turnover in successional campus forests (est. 3%/year), gap recruitment of pawpaw could largely replace > 20% of the tree canopy in a decade.

5

SPATIAL PATTERN AND COMPETITION BETWEEN PAWPAW (*ASIMINA TRILOBA*) AND SUGAR MAPLE (*ACER SACCHARUM*) IN SOUTHWESTERN ILLINOIS. Angela Luetkenhaus and Kurt Schulz. Southern Illinois University at Edwardsville, Edwardsville, IL 62026-1651. Sugar maple is considered the competitively dominant canopy tree on mesic sites in western Illinois. Nonetheless, we perceived patterns of spatial segregation between sugar maple seedlings and clones of pawpaw, a shade-tolerant understory shrub. We used belt transects to characterize spatial patterns of both species. Resampling methods were applied to test for negative association between species, implying competitive exclusion. Both species tend toward random to regular distribution in small plots irrespective of height. At higher scales patterns are inconsistent. Pawpaw stems of most size classes are positively associated with each other. Maple stems are negatively associated with each other except at the $\leq$ 25 cm size class. At intermediate size classes (25-200 cm) pawpaw and maple are negatively associated. Thus, the clonal structure of pawpaw permits it to proliferate in the forest understory, possibly compromising the perpetuation of a continuous sugar maple canopy.

6

COMPARATIVE GROWTH CHARACTERISTICS OF PAWPAW (*ASIMINA TRILOBA*) AND SUGAR MAPLE (*ACER SACCHARUM*) IN UNDERSTORY LIGHT CONDITIONS. Keith Biver, Kristen Glatz, Kurt Schulz, Ismat Husain and Angela Luetkenhaus. Southern Illinois University at Edwardsville, Edwardsville, IL 62026-1651. Pawpaw and sugar maple seedlings appear to compete strongly in the understory of the SIUE campus woods. To compare morphological growth features in these two species, we examined pairs of adjacent, similar sized pawpaw and sugar maple seedlings (0-2.5 m height). Branching angles in the two species were statistically indistinguishable (depending on site, ca. 25 or 45 degrees from horizontal) ($P = 0.97$, Wilcoxon paired sample test), but annual branch extension differed by 60% in favor of pawpaw. Greater branch extension, despite similar branching angles, translated into 70% greater height gain and 100% greater horizontal spread for pawpaw. Maple, conversely, produced more leaves and branches per unit branch length. These results argue that pawpaw is readily able to overtop maple and control understory canopy space. This may translate into a substantial increase in the time required for maple to reach the canopy.

7

ANATOMY OF EOSPERMATOPTERIS ERIANA FROM THE UPPER MIDDLE DEVONIAN (=GIVETIAN) OF NEW YORK. J.S. Boyer, Jr., S.D. Klavins, and L.C. Matten, Southern Illinois University, Carbondale, IL 62901. Specimens collected from New York State yielded new evidence on the anatomy of Eospermatopteris. A plant is divided into three apparent zones in cross section: a featureless pith-like center, a zone of vascular tissue, and an outer zone. The longitudinal surface of the outer zone has a wrinkled appearance, but upon closer examination an anastomosing system is evident. This outer 'bark' zone covered the zone of vascular tissue, at least in the more aerial portions. In most specimens, this outer 'bark' zone is missing, exposing the vascular zone, and giving the surface of the decorticated plant its characteristic pattern. The vascular system of Eospermatopteris is unique. The vascular zone is 4-4.5 cm wide and is composed of primary xylem strands. These strands form an interlacing vascular network that anastomose in three-dimensions. A permineralized portion of the vascular system has been examined using a Scanning Electron microscope. Protoxylem tracheids have been identified. They possess helical thickenings and are 16-18 μm in diameter. This represents the first documentation of vascular tissue in Eospermatopteris, and suggests that earlier interpretations of the plant be discarded.

8

GEOGRAPHIC INFLUENCES ON ILLINOIS TENSION ZONES. E. A. Corbett, R. C. Anderson, and G. F. Aspbury. Illinois State University, Normal IL 61790. Tension zones represent regions where many plant species end their ranges. These zones are used for delimiting floristic provinces. Previous work determined Illinois tension zones by counting the number of species ending their ranges in each county. However, this work did not consider county area. In the current study, a geographic information system was used to generate area-corrected tension zones, both as a county map and as a contour map generated from a polynomial function. The boundaries of tension zones were not greatly altered as a result of the area-correction. Southern Illinois, Northeastern Illinois, and counties along the Illinois River were found to be areas of high species turnover. The tension zones in Illinois correspond to differences in geographic features, such as soil type or glacial history, and climatic variables.

9

CHANGES IN SITE CHARACTERISTICS FOR A THREATENED, FUGITIVE FLOODPLAIN SPECIES, *BOLTONIA DECURRENS*, AS A RESULT OF THE FLOOD OF 1993. Paige A. Mettler-McClure and Marian Smith, Southern Illinois University Edwardsville, Edwardsville, IL 62026. Sites of the threatened floodplain species, *Boltonia decurrens* (Asteraceae), experienced severe flooding in 1993. *B. decurrens* is a fugitive species which establishes in disturbed sites along the Illinois and Mississippi Rivers, but is replaced by competing vegetation within 3-5 years of disturbance. Channelization of the rivers has altered the dynamic nature of these sites and is partially responsible for this species threatened status. Transects were re-established at the sites after the flood receded. The vegetative composition of 3 selected sites was determined, quantified and compared. The sites varied in floodwater inundation and duration of flooding. Site characteristics, including moisture, nutrient content, pH, texture and particle size, were measured following the flood of 1993 and compared to data collected in 1991. Data were compared to identify changes in site conditions resulting from the flood which might be critical to the preservation and management of this species. Increased light levels were recorded. Soil nutrients fluctuated, and in some cases decreased after the flood. Changes in soil texture, particle size and vegetative composition varied from site to site and appeared to be related to river and levee proximity.

10

SYSTEMATICS OF LEPIOTA HUMEI (AGARICALES, BASIDIOMYCETES) AND RELATED SPECIES. Brian P. Akers and Walter J. Sundberg, Southern Illinois University at Carbondale, Carbondale, IL 62901. *Lepiota humei* Murrill was described from north central Florida in 1943. This species exhibits a distinctive combination of characters which relate it to the segregate genera *Macrolepiota* and *Leucoagaricus*. Its spores are ovoid to elliptical, dextrinoid, metachromatic, and reveal no apical pore under light microscopy. The pileus displays an excoriating cuticle composed of upright, clavate cells that are tightly arranged, covered by a tangled mat of thinner elements that contain a refringent yellow pigment. This mat of pigmented cells is most dense at the center of the pileus, and gives the umbo a distinct yellow tint which changes to brown in age. *Leucoagaricus hortensis* (Murrill) Pegler, a species described in 1914 from Alabama, appears to have many similarities to *L. humei*, and is currently under study. Another apparently related species, represented by a single collection personally obtained from north central Florida, has not yet been identified. Studies of the type collections of all *Lepiota* species described from Florida, as well as personal collections and other authentic material are currently underway and should help clarify the relationships among these species.

11

PCR AMPLIFICATION OF nrDNA OF LEPIOTA SPP. (AGARICALES, BASIDIOMYCETES). Brian P. Akers, David A. Lightfoot, and Walter J. Sundberg, Southern Illinois University at Carbondale, Carbondale, IL 62901. Nuclear ribosomal genes of four species of *Lepiota sensu lato* were amplified by polymerase chain reaction. Whole genomic DNA was extracted from 10-30 mg. of dried basidiome tissue from the following species: *L. acutesquamosa*, *L. humei*, *L. fuscovinacea*, and *L. subrhacodes*. . Forward and reverse ITS primers were used to produce double-stranded amplification products representing ITS regions 1 and 2 plus the intercalary 5.8s genes. PCR products were visualized under UV light on a 1.4 % agarose gel containing ethidium bromide. *Lepiota fuscovinacea* appeared to have a slightly heavier amplification fragment than the other species, suggesting its ITS-plus-5.8s region is the longest of the four. Amplification of rDNA from *L. fuscovinacea* and *L. subrhacodes* required different concentrations of DNA and magnesium ion than the other two species. These amplified fragments are intended for DNA sequencing as part of a phylogenetic study of *Lepiota*.

12

IN SITU PREPOLLEN OF TELANGIUM SCHWEITZERI MATTEN AND FINE. S.D. Klavins and L.C. Matten, Southern Illinois University at Carbondale, Carbondale, IL 62901-6509. Telangium schweitzeri is a pollen organ containing in situ prepollen and occurs in Uppermost Devonian sediments at Ballyheigue, County Kerry, Ireland. Peels of the type specimens were prepared for examination using the SEM. The prepollen are angular and are smaller than those previously reported (diameter = 11.7 mm; n = 4). A trilete scar is visible on the distal surface. The surface is laevigate and lacks any prominent structures. Preliminary comparison with taxa in the dispersed spore flora indicates similarities with Auroraspora and Retusotriletes. Confirmation of the identity of the in situ prepollen with a dispersed spore taxon will provide information on temporal and geographic distribution of T. schweitzeri. A reconstruction of an early lyginopterid seed fern from Ballyheigue predicts connection among Telangium (pollen organ), Hydrasperma (cupulate ovules) and Laceya (stem and frond). This study will be followed with an examination of prepollen in the pollen chamber of Hydrasperma. Correspondence of features will support the reconstruction of Laceya and confirm the association of Telangium with Hydrasperma.

13

AN ASSESSMENT OF THE MYCORRHIZAL FUNGAL STATUS OF WETLAND PLANT SPECIES. S.D. Turner and C.F. Friese, University of Dayton, Dayton, OH 45469-2320. Wetland ecosystems are important because of their ecological significance in such areas as natural waste decomposition and nutrient cycling. Much has been accomplished in determining the floristics and edaphic characteristics of these areas but little is known about the function of the below ground system. This study was designed to collect descriptive data on the mutualistic mycorrhizal fungal community associated with the various plant species of a wetland prairie/marsh (SAIC Prairie, Greene County, Ohio). The overall analysis of the wetland plants will determine the significance of mycorrhizal fungi in wetlands and with individual plant associations.

14

PALEOLIMNOLOGY OF CROOKED LAKE, MICHIGAN K.McKeever, S.McCance, C.Sesvold, and R.Brugam. Southern Illinois University, Edwardsville, IL, 62026. We took a sediment core from the northwest basin of Crooked Lake in Michigan. Analysis of fossil diatom assemblages reflect changes in the lake since its formation. The presence of planktonic Cyclotella at the bottom of the core suggests deep, clear waters early in the lake's history. The disappearance of all planktonic species at 6465 BP, followed by increasing abundances of benthic species such as Fragilaria construens venter, suggests shallowing due to increased evaporation from the lake's surface during the mid-postglacial warm period. Fragilaria construens venter decreases at 3248 years BP, whereas Melosira ambigua begins to gradually increase up to the present day. Crooked Lake appears to be slowly increasing in depth as climate cools.

15

VARIATION IN TANNIN PRODUCTION IN POPULATIONS OF MEXICAN *ACACIA* SPECIES. K. E. Readel, D. S. Seigler, J. E. Ebinger and H. David Clarke, University of Illinois, Urbana, IL 61801. Previous work has shown the presence of tannins in the bark of many species of *Acacia* in the southwestern United States and northeastern Mexico. However, variation within and between species of *Acacia* has not been investigated. The goal of this study was to compare the percentage of tannin in bark for five species of *Acacia*. Several populations of each species were sampled and bark was collected from both large and small branches. Percentage of tannin was determined by precipitation with casein. There was little variation in tannin content between populations and between bark from large and small branches of the same species. There was significant variation between species, with *A. bilimekii* having the highest percent tannin (11-18%). Bark of *A. berlandieri* and *A. farnesiana* had the least amount of tannin (4.5 - 11%). Similarly, *A. bilimekii* had a greater amount of bark (29-46% of total weight) as compared to *A. berlandieri* (19-24%) and *A. farnesiana* (17-25%). This data will be useful in constructing a model for estimation of total tannin production per hectare for these species.

16

VEGETATION-SUBSTRATE RELATIONSHIPS OF A SANDSTONE OUTCROP ALONG THE OHIO RIVER IN HARDIN COUNTY, ILLINOIS. *M.A. Basinger*, *S.B. Franklin*, and *J.P. Shimp*, Southern Illinois University, Carbondale, IL 62901. This study describes the vegetation and physical environment of a sandstone outcrop, unique due to its proximity along the Ohio River, east-facing aspect, and dominant vegetation. One-hundred eight 1-m^2 quadrats were sampled to describe the vegetation and substrates on this outcrop. Five dominance types were identified by COMPAH, an agglomerative clustering program, using vegetation data. These were (1) *Rinodina oxydata*, (2) *Endocarpon pusillum-Psorotichia schaereri*, (3) *Ulmus rubra*, (4) *Amorpha fruticosa-Panicum virgatum*, and (5) *Atrichum angustatum-Hypericum prolificum* types. Lichens were the dominant vegetation with 38% cover. Three substrate types comprised 93% of the outcrop surface: (1) dripway rock 45%, (2) bare rock 24%, and (3) talus rock 24%. Stepwise discriminant function analysis using substrate variables identified 5 variables as significant predictors ($p < 0.01$) of dominance types on this outcrop. These were, from most to least important, (1) dripway rock, (2) talus rock, (3) bare rock, (4) rock depressions, and (5) loess deposits.

17

POST-GLACIAL VEGETATION RECORD FROM A PEAT BOG IN THE UPPER PENINSULA OF MICHIGAN. B. Owen and R. Brugam Southern Illinois University, Edwardsville, IL, 62026. We analyzed a peat core from Glimmerglass Bog in the Sylvania Wilderness Area, Gogegic Co. Michigan for pollen. The bog developed in a small pond beside a larger lake. The core site was covered by a floating mat about 6900 years ago. The infilling of the bog continued until 5000 years ago the bog mat grounded on the accumulating sediment. The core shows a full post-glacial record of vegetation with spruce (Picea sp.) and Diploxylon pine pollen near the bottom of the core and hemlock (Tsuga canadensis) with Haploxylon pine pollen near the top of the core. The arrival of hemlock pollen 3,000 years ago indicates the colonization of the site by the modern Northern Hardwoods forest and the late glacial cooling of midwest climates.

18

SEASONAL PATTERNS IN THE EFFECT OF THE INVASIVE EXOTIC *VINCA MINOR* ON THE UNDERSTORY OF KNOBELOCH NATURE PRESERVE, A SOUTHWESTERN ILLINOIS MESIC FOREST. Kurt Schulz and Carol Thelen. Southern Illinois University at Edwardsville, Edwardsville, IL 62026-1651. *Vinca minor* has colonized ca. 4% of the understory of this remnant near-virgin oak-hickory forest. Previous studies showed substantial reductions in the diversity of late summer understory species in the colonized region, but that cutting and herbicide treatments effectively reduced *Vinca* cover and stimulated tree seedling recruitment. Sampling conducted in May 1995 reveal a milder depressive effect on spring species diversity. In both spring and summer, forest understory composition in uncolonized areas tends to be dominated by a few abundant species. The effect of *Vinca*, then, is to displace abundant understory dominants, not rarer species.

19

LITTER DECOMPOSITION IN COAL SLURRY PONDS. J. Taylor and B. Middleton, Southern Illinois University, Carbondale, Il. 62901. Decomposition rates of *Potamogeton nodosus*, *Phragmites australis Cyperus erythrorhizos*, *Typha latifolia* and *Ceratophyllum demersum* in a coal slurry and natural pond were studied. Decomposition rates, calculated using the negative exponential model, were higher for submerged plants (*Ceratophyllum demersum*, k=9.38 - 15.23; *Potamogeton nodosus*, k=3.65 - 3.60) than for emergent plants (*Phragmites australis*, k=2.68 - 1.77; *Cyperus erythrorhizos*, k=1.36 - 0.52; *Typha latifolia*, k=0.90 -0.97). Regression analysis of log transformed data indicated that decomposition rates were very similar in coal ponds as compared to natural ponds. In terms of decomposition rates, there is little functional difference between coal slurry and natural ponds.

20

VEGETATION OF TEMPORARY SAND PONDS OF THE ILLINOIS RIVER SAND AREA SECTION. W.E. McClain, Illinois Department of Conservation, Springfield, IL 62701, R.D. McClain, Auburn High School, Auburn, IL 62615 and J.E. Ebinger, Eastern Illinois University, Charleston, IL 61920. The vascular flora of five temporary sand ponds in Mason and Cass Counties were examined during the fall of 1994. All ponds had been in row crops in 1992, but due to excessive rainfall were flooded during the 1993 and 1994 growing seasons. More than 50 species were found associated with the ponds, 26 being obligate wetland species. Dominant species included Eleocharis obtusa (Willd.) Schult., Panium dichotomiflorum Michx., Polygonum pensylvanicum L., P. amphibium L., Rorippa sessiliflora (Nutt.) Hitchc., Scirpus hallii Gray, S. tabernaemontanii K. C. Gmel. and Typha latifolia L. Scirpus hallii, an endangered species in Illinois, was found at all of the sites and sometimes was the dominant species.

21

EFFECT OF SEED MASS AND MORPHOLOGY ON GERMINATION IN A THREATENED, FUGITIVE FLOODPLAIN SPECIES, *BOLTONIA DECURRENS*. John Cawly, Ginger Hagler and Marian Smith, Southern Illinois University Edwardsville, Edwardsville, IL 62026. The threatened floodplain species, *Boltonia decurrens* (Asteraceae), is a fugitive species which establishes in disturbed sites along the Illinois and Mississippi Rivers. The perfect disk flowers produce a flattened, heart-shaped achene while the female ray flowers produce a smaller, wedge-shaped achene. To better understand seedling ecology of *B. decurrens*, this study examines whether there is a correlation between germination rates and subsequent growth in varying seed masses and types. The dimorphic seeds of *B. decurrens* were sorted into size classes and then separated by morphology. Germination times were recorded and subsequent growth measured for each class. Percent germination and germination rate are unaffected by either achene mass or morphology; however, mass is related to cotyledon size. Preliminary results indicate that there is no correlation between cotyledon size and subsequent growth.

22

GROWTH, STOMATAL CONDUCTANCE AND FLUORESCENCE RESPONSES TO ROOT-ZONE SATURATION IN A THREATENED FLOODPLAIN SPECIES, BOLTONIA DECURRENS, COMPARED TO THREE COMPETITORS. Marian Smith and Scott Moss, Southern Illinois University, Edwardsville, IL 62026. Boltonia decurrens, Asteraceae, is endemic to the Illinois River Valley and is threatened with extinction due to flood-management practices. B. decurrens survives long periods of root-zone saturation, and is a dominant member of the plant community following a flood, but is replaced by other species after 3-5 years of succession. It was hypothesized that B. decurrens would demonstrate greater physiological tolerance to flooding than three species, Conyza canadensis, Aster ontarionis, and Aster pilosus, which become competitors in the second year after flooding. Plants were grown under flooded conditions for 10 weeks. Stomatal conductance and fluorescence, as indicators to physiological response, were measured weekly and biomass was determined for control and flooded plants at the end of the 10-week study. Biomass and stomatal conductance measurements indicate the order of flood tolerance is Bd>Ao>Ap>Cc; however, fluorescence is not diagnostic of flood stress.

23

EFFECT OF FIRE ON SANDHILL HERBS: NUTRIENTS, MYCORRHIZAE, AND BIOMASS ALLOCATION. Roger C. Anderson, Illinois State University, Normal, IL 61709-4120 and Eric S. Menges, Archbold Biological Station, P. O. Box 2057, Lake Placid, FL 33852-2057. Three species (Aristida stricta, Liatris tenuiflora var. laevigata, and Pityopsis graminifolia) responded positively to conditions following the burn by increased vegetative growth and flowering. The fourth species, Balduina angustifolia, is a fire sensitive species and was essentially eliminated by burning. The burned occurred in February and in March several species had higher concentration of several inorganic nutrients in their tissues on the burned site than on the unburned site. Despite low levels of inorganic nutrients, including phosphorus, mycotrophy was not well developed among the species, except for the tap-rooted Balduina angustifolia.

24

THE EFFECTS OF AGRICULTURE ON THE SEED BANKS OF THE AMERICAN BOTTOMS FLOODPLAIN OF THE MISSISSIPPI RIVER. C.P. Giedeman and B.A. Middleton, Southern Illinois University, Carbondale, IL. 62901. Portions of this floodplain were farmed in Pre-Columbian times as well as modern times. Samples of the seed bank were taken from four types of sites - never farmed, farmed only in Pre-Coumbian times, farmed only during modern day, and farmed during both periods. One set of samples was taken in spring, another in fall. They were sifted and grown in a greenhouse setting with three different water levels-drawn down, saturated and flooded. Seedlings that became established were counted and identified. This study examined the potential of these farmed seeds banks for restoration of wetland vegetation. This study also provides information about the degree of distrubance by Pre-Columbian and modern day agriculture.

A NEW MEMBER OF THE PSEUDOSPOROCHNALES FROM THE UPPER MIDDLE DEVONIAN GILBOA FLORA OF NEW YORK STATE. L.C. Matten, J.S. Bover Jr., R.A. Gastaldo, S.D. Klavins, B.A. Roy, and W.R. Tanner. Southern Illinois University at Carbondale, Carbondale, IL 62901-6509. A new pteridophyte occurs in the Moscow Formation, Hamilton Group, Erian Series (=Givetian; upper Middle Devonian) at the Manorkill Falls locality adjacent to the Schoharie Reservoir in New York State. The new taxon consists of erect, unbranched (circinnate?) stems covered with helically-arranged lateral branches. In vegetative specimens, the lateral appendages appear crowded, slender and elongate in the apical region of the stem and less dense, thicker and shorter in the basal region. Each lateral branch is composed of a central main axis that bears opposite to sub-opposite ultimate appendages consisting of unwebbed axes that dichotomize at least twice. The tips of the ultimate appendage are elongate and arc adaxially out of the plane of attachment. A fertile stem has a basal vegetative portion and an apical sporangial-bearing portion. The sporangia are borne terminally and singly on ultimate appendages that dichotomize at least twice. The manner of attachment of the fertile ultimate appendages to an axis of a lateral branch or the main stem axis can not be demonstrated at this time. The organization of the sterile and fertile lateral appendages conforms to the morphology demonstrated for Pseudosporochnus however, two essential morphological features attributed to Pseudosporochnus (digitate branching and sclerotic nests in the cortex) are absent in the Gilboa specimens. The new combination of characters is the basis for proposing a new taxon for these plants.

26

CYPRESS SEED GERMINATION IN RELATION TO SOIL MOISTURE AND TEMPERATURE ALONG THE CACHE RIVER, SOUTHERN ILLINOIS. P. M. Villeda[1], B. A. Middleton[2], H. Harris[2], 1. DePaul University, Chicago, IL 60647 2. Southern Illinois University at Carbondale, Carbondale, IL 62901. The germination of cypress seeds occurs in a narrow zone at the edge of permanently flooded cypress swamps during drawdown in the spring and summer. Seed germination is limited both by the presence of viable seeds in the soil which disperse in the flood waters during the winter and by the appropriate level of soil moisture. These conditions are met in the drying zone of the swamp, but not in the permanently flooded swamp or in the non-flooded portions of fields beyond the edge of the winter flood sheet. The zone of germination had lower soil moisture than the non-flooded field and the permanently flooded swamp (26.4%, 68.9% and 100.1%, respectively). This implies that permanently flooded swamps have a much lower potential seed germination and subsequent seedling recruitment potential than swamps which drawdown more completely during the summer season.

27

RESPONSE OF SOIL REDOX POTENTIAL TO CHANGES IN DEPTH TO WATER TABLE AND SOIL OXYGEN CONTENT. K.E. Fessel[1] and R.P. Gambrell[2]. [1] Southern Illinois University, Carbondale, IL 62901 [2] Louisiana State University, Baton Rouge, LA 70803. Redox potential, depth to water table and soil oxygen content were measured at three sites along a forested transect from hydric to non-hydric soils in Louisiana. Our hypothesis was that redox potential would reflect changes in depth to water table and soil oxygen content. When the water table was above the depth at which redox potential and oxygen content were measured, there was a decline in soil oxygen content and redox potential at that depth. During periods of high water table, redox potential declined to levels indicative of reducing conditions (less than 350 mV) and returned to levels indicative of oxidizing conditions (greater than 350 mV) following drying of the soil.

28

SEED BANKS OF CYPRESS SWAMPS IN THE CACHE RIVER REGION. B. A. Middleton, Southern Illinois University at Carbondale, Carbondale, IL 62901. Some species of seeds of cypress swamps are not maintained for long periods of time in the seed bank. For example, cypress swamps are nearly devoid of cypress swamps seeds if farmed for any length of time. The seed banks of unfarmed cypress swamps have species including including *Cephalanthus occidentalis*, *Hottonia inflata* and *Limnobium Spongia* (9.1, 7.4 and 2.7 seeds m^{-2}, respectively) which are not found in farmed cypress swamps. *Taxodium distichum* is a short-lived component of the seed bank and likely to be dispersal dependent because less than 6% of the seeds remain viable for longer than one year in the swamp. The characteristic seed banks of cypress swamps are found in farmed fields following the edge of the swamp into farmed fields but end abruply at the edge of the high water mark. Because seeds disperse in the water, the restoration of natural hydrologic regime can be an effective tool in the restoration of cypress swamps in abandoned farm fields.

29

HIGHER LEVEL INFLORESCENCES IN THE ASTERACEAE--A WIDESPREAD PHENOMENON. Elizabeth M. Harris, Botany, Eastern Illinois University, Charleston, IL 61920. The Asteraceae are characterized by their head or capitulum type of inflorescences. Very often multiple capitula are grouped into higher order arrangements or synflorescences. In many Asteraceae taxa, the individual or primary capitula become fused producing secondarily or even tertiarily condensed units termed syncephalia (fused heads). Investigations of young capitula demonstrate that the condensation into syncephalia is achieved by three main developmental processes: reduction in the number of florets, fusion of primordia and suppression. These processes can be invoked in different sequences and durations to yield the different forms of syncephalia found throughout the family.

30

EFFECTS OF OZONE ON SOYBEAN SEED VIGOR. K.A. GERLACH and J.M. Coons, Eastern Illinois University, Charleston, IL 61920. Soybeans are negatively affected by photochemical oxidants such as ozone. Although many studies have considered effects on seed yield and composition little research has focused on how ozone affects seed vigor. Soybean seeds (Glycine max L. Merr. cv 'Essex' and 'Forrest') were obtained from Dr. Mulchi of the University of Maryland. These seeds were from plants which were exposed to four regimes of ozone during seed development. The four regimes of ozone were charcoal-filtered (no O_3), non-filtered (ambient O_3), non-filtered + 40 nLL^{-1}, and non-filtered + 500 ppm CO_2. The objective of this study was to assess how ozone during seed development affects vigor of seeds. Seed vigor was tested directly by field emergence and germination. Leakage of solutes was used to test seed vigor indirectly. Leakage of amino acids, sugars and ions from seeds was quantified by the ninhydrin method, the anthrone method, and electrical conductivity, respectively. Data was analyzed by ANOVA followed by mean separations. Field studies indicated some significant effects on plant height due to cultivar, however, no differences were found due to ozone. Differences were seen in germination and root length tests due to ozone. No differences were seen in amino acids, sugars and ion leakage due to ozone.

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LICHEN USE BY LARVAL *LEUCOCHRYSA PAVIDA* (NEUROPTERA: CHRYSOPIDAE). P.J. Wilson and A.S. Methven, Eastern Illinois University, Charleston, IL 61920. *Leucochrysa pavida* is a species of green lacewing that uses lichen fragments to build a larval "debris packet." Since only minute fragments are harvested for formation of the packets, identification of the actual lichens utilized is difficult using morphological characteristics. By comparing the chemistry of lichen communities at Tower Rock Recreation Area in Hardin County, Illinois, with the chemical identified during thin layer chromatography of larval packets, *L. pavida* larvae were found to selectively use material harvested from the unstratified, crustose lichens *Lecanora strobilina* and *Lepraria sp. # 1* and the stratified lichen *Myelochroa aurulenta*.

32

THE HEAT SHOCK RESPONSE OF COOL-INCUBATED BARLEY ALEURONE LAYERS. Joel Duckworth and Mark R. Brodl, Department of Biology, Knox College, Galesburg, Il. 61401. When treated with gibberellic acid (GA_3) barley aleurone layers synthesize and secrete an array of hydrolytic enzymes. Normally aleurone layers are incubated at 25°C, but when exposed to heat shock (40°C) the synthesis and secretion of hydrolytic enzymes is arrested and heat shock protein synthesis is induced. In addition the mRNAs encoding secretory proteins are destabilized, and the ER lamellae upon which these mRNAs are translated dissociate. In this study, GA_3-treated aleurone layers were incubated at 15 or 20°C (rather than 25°C) and then were heat shocked at temperatures ranging from 27.5°C to 40°C (in 2.5° increments). SDS-PAGE analysis of ^{35}S-methionine-labeled samples revealed that cool-incubated aleurone layers synthesize hsps at temperatures much below normal induction temperatures. In addition, exposure to temperatures 4°C over the temperature for maximal hsp induction (44°C) is normally lethal to aleurone layers incubated at 25°C. However, cool-incubated aleurone layers maintain protein synthesis up to 10°C over the temperature of maximal hsp synthesis. Comparing the HS response of warm- and cool-incubated aleurone layers has the potential to provide important clues about the induction of the HS response.

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THE HEAT SHOCK RESPONSE OF WARM-INCUBATED BARLEY ALEURONE LAYERS. Alisa Shaw and Mark Brodl, Department of Biology, Knox College, Galesburg, Il 61401. The aleurone layers of barley grains synthesize and secrete an array of hydrolytic enzymes when incubated in the presence of gibberellic acid. Exposure to the heat shock temperature of 40°C results in the induction of heat shock protein (hsp) synthesis and the selective suppression of secretory protein synthesis, such as α-amylase. The suppression of secretory protein synthesis can be attributed to the destabilization of secretory protein mRNAs. Concomitantly, heat shock causes a dissociation of the ER lamellae upon which these secretory proteins are translated. We have hypothesized that the loss of translation sites at the ER serves as a point of discrimination for selectively destabilizing secretory protein mRNAs. In examining how barley aleurone layers adapt to high temperature, we have found that, in addition to synthesizing hsps, the ER is able to make adjustments to the high temperature by retailoring the phospholipid composition of the ER membrane. In this present study, we incubated aleurone layers at temperatures warmer than the normal incubation temperature of 25°C, but below the induction temperature for hsp synthesis (verified by western blotting). Analysis by SDS-PAGE revealed that exposure to temperatures 30 to 35°C did not markedly diminish α-amylase synthesis and also did not induce hsp synthesis. When aleurone layers warm-incubated at 32 and 34°C were exposed to 40°C, the synthesis of α-amylase continued at 32 and 44% of control levels (respectively), as compared to 6% in 25°C-incubated heat-shocked samples. Northern hybridization indicated the presence of increased α-amylase mRNA levels in warm-incubated, heat-shocked layers. These data indicate the synthesis of hsps is not the only important component in the heat tolerance of barley aleurone layers. We are currently examining the lipid composition of ER membranes in warm-incubated barley aleurone layers.

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THE CONSTRUCTION OF BINARY VECTORS CONTAINING THE cDNAs CODING FOR HUMAN FIBRINOGEN. P. Vordtriede, J. Hensley, and M. Bolyard. Southern Illinois University at Edwardsville, Edwardsville, Illinois 62025. In an effort to produce functional human fibrinogen in potato tubers, our laboratory has constructed plasmids containing the cDNAs of the human fibrinogen genes γ and Bβ, and we are currently constructing the Aα-containing vector. These plasmids contain the border sequences necessary for plant transformation by *Agrobacterium tumefaciens*, a prokaryotic kanamycin resistance gene (NPT II) fused to a plant promoter, and a fibrinogen cDNA (Aα, Bβ, or γ) linked to the tuber-specific promoter for patatin. The border sequences flank the NPT II gene and the fibrinogen cDNA. Completed expression vectors were identified by PCR and confirmed by sequence analysis.

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AN IMPROVED METHOD FOR PURIFICATION OF CERATO-ULMIN. A.K. Gundlach, K.R. Diel, and M.G. Bolyard, Southern Illinois University at Edwardsville, Edwardsville, Illinois 62025. Dutch elm disease (DED), caused by the fungus Ophiostoma ulmi, is responsible for the reduction of many elm trees from the landscape. The fungus produces cerato-ulmin (CU), a relatively small hydrophobic protein which is currently believed to be the disease-causing phytotoxin. Research for DED is aided by a readily available supply of purified CU and current methods were developed by DR. W. Richards and Dr. S. Takai. By utilizing the protein's hydrophobic nature, purification may be completed in substantially less time by modifying filtration, centrifugation, and aeration. Purity of the samples is not compromised with this protocol.

36

rDNA SEQUENCE FOR IDENTIFICATION OF CRYPTIC SPECIES OF MALARIA VECTORS IN SOUTH AMERICA. G. N. Fritz, Zoology Dept., Eastern Illinois University, Charleston, IL. 61920. The purpose of this investigation was to find suitable DNA sequences that would be useful in developing two molecular methods, the polymerase chain reaction (PCR) and dot blotting, for identifying five cryptic species of human malaria mosquitoes in South America. Specimens of all species were collected throughout South America and the internal transcribed spacer 2 (ITS2) of ribosomal DNA was sequenced. The ITS2 was determined to be suitable for developing both detection methods because of its high copy number, species specific sequence differences, and concerted evolution.

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THE IDENTIFICATION OF CRYPTIC SPECIES OF MALARIA VECTORS IN SOUTH AMERICA USING DOT BLOTS AND POLYMERASE CHAIN REACTION. G. N. Fritz and S. J. Engman, Zoology Dept., Eastern Illinois University, Charleston, IL 61920. The purpose of this investigation was to develop two molecular methods, the polymerase chain reaction (PCR) and dot blotting, for identifying five cryptic species of human malaria mosquitoes in South America. Species specific primers that produce diagnostic fragments for each species in PCR were made using sequence data from a rDNA spacer. Oligonucleotides used as primers above were also labeled with digoxigenin and used to identify species in dot blots.

38

COPPER MODULATES NITRIC OXIDE PRODUCTION IN THE MURINE MACROPHAGE CELL LINE RAW 264.7. B. E. Wilson, J. Davidson, and S. Fan, Bradley University, Peoria, IL 61625. Copper is an essential trace element for humans and animals. While overt symptoms due to copper deficiency have been observed in premature infants, malnourished children, and adults on Total Parenteral Nutrition, possible effects of moderate copper deficiency are difficult to assess in apparently healthy adults. We have posed the hypothesis that copper availability affects immune responses by modulating the functions of an integral component of the immune system, the macrophage. To test this hypothesis, we have measured macrophage nitric oxide production by a murine macrophage cell line (RAW264.7) in response to stimulation by interferon-γ and bacterial lipopolysaccharide. We report here that increasing copper levels elevated macrophage NO production, whereas chelating copper with the chelator tetraethylpentamine (TEPA) decreased macrophage NO production. The amount of NO production modulated by copper seems to be 30 - 40% that produced without added copper. Since NO is involved in macrophage bacteriocidal and tumoricidal activities, its modulation by copper could have important implications on host resistance to infections and neoplasm.

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DNA TRANSFORMATION OF GERMINATED *TAXUS BREVIFOLIA* EMBRYOS.
E.C. Luan and M.G. Bolyard. Southern Illinois University at Edwardsville. Edwardsville. IL 62026-1651. Paclitaxel (Taxol™) is isolated from the bark of the *Taxus brevifolia*. Increasing demand for this anticancer drug threatens its supply and the existence of the native tree population. Attempts are underway to increase supplies of paclitaxel by genetic manipulation of the plant genome. Our research contributes to this strategy by developing steps toward identifying the genes involved in the biosynthesis of paclitaxel. DNA transformation of germinated *Taxus brevifolia* embryos was established previously using DMSO (Allen, 1994); however, in this project, conditions for transformation were optimized to ensure efficient, successful, and consistent delivery of foreign DNA into the cells of *T. brevifolia* embryos. Our studies also suggested that the uptake of DNA into these embryos may be ion-dependent and significantly enhanced by the presence of DMSO.

40

EFFECTS ON MICROTUBULE-ASSOCIATED PROTEINS (MAPs) BY PHOSPHATASE INHIBITION.
S. Karst and P. Wanda, Southern Illinois University, Edwardsville, Il 62026.
African Green Monkey Kidney cells , VERO, were treated with 0, 0.5, 1, 2, and 5 uM okadaic acid (OA), a potent inhibitor of phosphatase activity. Cell viability, determined by the trypan blue exclusion test, decreased by 25% after a 30 minute incubation in the presence of 2 uM OA. The effects of OA on the structural organization of intermediate filaments was assayed by indirect immunofluorescence (IIF). In particular, we assayed vimentin, a microtubule-associated protein (MAP). VERO cells, incubated in a petri dish containing sterile glass cover slips, were treated with OA and then fixed in ice-cold methanol. They were then exposed to mouse monoclonal antivimentin antibody followed by FITC-goat antimouse antibody. The fluorescence patterns of OA treated and untreated cells were observed with an Olympus BH-2-RFCA fluorescence microscope. Untreated cells displayed a regular staining pattern, while OA treated cells showed a disrupted staining pattern. These preliminary results indicate that disruption of the integrity of one class of MAPs, vimentin, correlates with a decrease in cell viability.

41

MOLECULAR STUDIES ON A CLASS OF CALCIUM-BINDING PROTEINS IN *VORTICELLA*.
J. J. Maciejewski, *E. J. Vacchiano*, and *H. E. Buhse, Jr.*, Department of Biological Sciences, University of Illinois at Chicago, Chicago, IL 60607. The cytoskeletal elements of *Vorticella* contain members of a family of proteins which we call calfilamins. These proteins, with molecular weights in the range of 20 kD, are characterized as calcium-binding, filament-forming, cytoskeletal proteins. This family currently consists of the spasmins (Amos, 1986) and the centrins (Salisbury, 1987), including caltractin (Huang et al., 1988). *Vorticella* spasmin has been shown to be immunologically related to the well-characterized *Chlamydomonas* calfilamin, caltractin. The caltractin gene has been cloned and sequenced and is similar to the CDC-31 gene in yeast (Huang et al., 1988). Efforts are now underway to examine the relationship between the spasmin and caltractin genes in *Vorticella*. A cDNA library for *Vorticella convallaria* was constructed in λZAP, using reverse-transcribed cDNA primed from poly-A RNA. A full-length *Chlamydomonas* caltractin cDNA clone was used to screen the *Vorticella* library, resulting in the isolation of the putative *Vorticella* caltractin cDNA. In addition, amino acid sequence information from a *Vorticella convallaria* spasmin peptide was used to design a pool of degenerate PCR primers for the amplification of spasmin cDNAs. The PCR products have revealed that they have sequence homology to each other, as well as to the *Chlamydomonas* caltractin gene.

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A NOVEL METHOD USING CALCIUM PHOSPHATE (MONOBASIC) AND LOW pH FOR MASS INDUCTION OF TELOTROCHS IN THE CILIATED PROTOZOAN VORTICELLA CONVALLARIA. P.J. De Baufer, and S.C Pak, and T. Lopez, and C. Yang, and A. Amin, and H.E. Buhse, Jr. Department of Biological Sciences, University of Illinois at Chicago, Chicago, IL 60607. Populations of Vorticella convallaria exhibit two main morphological forms: a sessile, trophic form called a stalked zooid and a motile, dispersive form, called a telotroch. In nature, tranformation from one cell type to the other is enviromentally controlled. When conditions deteriorate sufficiently, the stalked forms transform into telotrochs and swim away leaving the stalk behind. The telotrochs then locate a more suitable environment where they reattach and reform the stalk. The stalk itself is a complicated structure that includes components such as the spasmoneme, an ATP-independent contractile organelle, and the extracellular material made up of a matrix and a sheath. Molecular and biochemical studies of cell transformations and stalk formation require large numbers of cells in same developmental stage, preferably in early stages of ontogeny. Previous methods for mass telotroch induction have relied on physically damaging the stalk by scraping cultures of attached cells. This method is unreliable and induces only a few cells to form telotrochs. We have devised the following two step chemical method for mass telotroch induction. Greater than 90% of attached cells (2.8×10^4 to 1.5×10^5 cells per petri dish) are detached from their stalks following exposure a 20 minute exposure to 4.8 mM $CaH_4(PO_4)_2$. The isolated zooids are immediately suspended in inorganic medium buffered to pH 6.8 and, within 105 minutes, over 90% of the cells transform into telotrochs.

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ARE URNS FROM DIFFERENT SIPUNCULAN GENERA FUNCTIONALLY SIMILAR? A COMPARISON OF THE URNS OF *PHASCOLOSOMA PERLUCENS* WITH THOSE OF *SIPUNCULUS NUDUS* (PHYLUM SIPUNCULA). T. Veith, N. Gruchala and L.K.Dybas, Knox College, Galesburg, IL 61401. Ciliated urns are multicellular complexes found either free-swimming in the coelomic cavity or fixed to the peritoneum in some sipunculan species. The free urns move through the coelomic cavity trapping dead cells and foreign material in their mucus secretions. Hypersecretion of urns of *S. nudus*, as stimulated by various fluids of human and bacterial origin, have been studied by Bang and his co-workers. In our study, the urns of *P. perlucens*, which differ in morphology from those of *S. nudus*, are challenged by substances tested on *S. nudus* urns so that urn function can be compared. *P. perlucens* urns differ in vital dye uptake and in incorporation of the dye in newly synthesized mucus secretions. Urns from both species hypersecrete after addition of sodium acetate, pH 7.4, but only *S. nudus* urn secretion is inhibited after raising the pH to 9.0 with addition of ammonium hydroxide. The cells of *P. perlucens* urns retain their original position during hypersecretion in contrast to the change in position of "R" cells in *S. nudus* urns. Both urns secrete mucoid substances in response to the same stimuli however the secretions from *S. nudus* urns are more copius. Under the electron microscope, fibrin-like strands are visible in the secretions suggest a protein secretion as well or secretion of a factor that initiates localized clotting.

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A COMPARISON OF THE HEAT STRESS TO THE HEAT SHOCK RESPONSE IN THE SIPUNCULAN WORM, *PHASCOLOSOMA PERLUCENS*. N. Gruchala, T Veith and L.K. Dybas. Knox College, Galesburg, IL 61401. The marine sipunculan, *P. perlucens*, has extensive habitat ranges including the intertidal zone where temperatures fluctuate. The heat shock response in *P. perlucens* is characterized by induction of four distinct heat shock proteins (HSPs) as identified by SDS-PAGE that are maximally induced at 4 hrs at 40° C, 15° C above the temperature of acclimatization. The HSPs persisted for more than 20 hrs after return to ambient temperature. A more gradual increase in temperature over time would more accurately simulate *P. perlucens'* natural environment. In our heat stress experiments we brought body wall samples from 25 °C to 40 °C in increments of 2.5 °C every 30 minutes. The heat stress response is characterized by sequential induction of new proteins, some not found durning heat shock, and selective suppression of both new and control temperature proteins. SDS-PAGE data revealed two new proteins at 27° C which were surpressed at 32° C. HSP 70 appeared at 37° C. At 40° C and during the 20 hr recovery period the protein patterns of heat shock and heat stress were similar. At 27° C there was an initial burst of secretion which declined as the temperature increased to 40° C. Secretory proteins continued to be produced up to 16 hrs recovery. At 20 hrs there was suppression of secretion, possibly an indication of maximum time body wall samples can be incubated *in vitro* or depletion of some essential amino acid.

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THE EFFECTS OF HEAT SHOCK ON THE SYNTHESIS OF BARLEY LECTIN IN TRANSGENIC TOBACCO. Sue Gormley and Mark R. Brodl, Department of Biology, Knox College, Galesburg, IL 61401. Barley aleurone layers secrete an array of hydrolytic enzymes when exposed to gibberellic acid (GA_3), most notably alpha-amylase. When exposed to heat shock (HS, 40°C), the synthesis of HS proteins is induced while the synthesis of secretory proteins is selectively suppressed. The synthesis of nonsecretory proteins continues during HS. HS causes a selective destabilization of secretory protein mRNAs, yet the mRNAs of nonsecretory proteins remains stable during HS. Visualization by TEM has revealed that HS causes a dissociation of the stacks of ER lamellae. Translation of secretory proteins occurs on ER-bound ribosomes; a hydrophobic chain of twenty amino acids encodes a signal sequence that directs secretory protein synthesis to take place at the ER. Nonsecreted proteins do not contain a signal sequence. The selective destabilization of mRNA for secretory proteins may therefore be determined by the presence or absence of a signal sequence. To investigate whether this is the case, we have grown transgenic tabacco plants that carry a gene for barley lectin, a protein normally targeted to the vacuole. Synthesis of vacuolar-targeted proteins also takes place on the ER. One transgenic line lacks the signal sequence and vacuolar targeting peptide, while the other transgenic line contains this sequence. We will report on the effect of HS on the synthesis of barley lectin proteins and on barley lectin mRNA stability in our transgenic tobacco.

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The Heat Shock Response of Barley Aleurone Layers Incubated in the Presence of Gibberellic Acid and Abscisic Acid. C.E. Katholi and M.R. Brodl, Knox College, Galesburg, IL 61401. Gibberellic acid (GA) naturally occurs in the mature barley grain and functions to induce the synthesis and secretion of hydrolytic enzymes, such as alpha-amylase, that promote germination. During heat shock (HS), the synthesis of these proteins is arrested, while the synthesis of heat shock proteins is induced and the synthesis of nonsecretory proteins continues. This exposure to the heat shock (HS) temperature of 40°C results in the induction of heat shock proteins and the dissociation of the endoplasmic reticulum. Also, as a result of heat shock, secretory protein mRNA is degraded and the stacks of ER lamellae upon which they are translated is dissociated. Abscisic acid (ABA) is a phytohormone that is naturally produced in barley grains and is associated with the synthesis of storage proteins and the promotion of dormancy. ABA is also associated with plants undergoing stresses such as drought and osmotic stress. In this study we have examined how ABA-treated barley aleurone layers respond to HS . When incubated in the presence of ABA alone, SDS-PAGE analyses of ^{35}S-methionine-labeled proteins revealed that ABA-induced protein synthesis and secretory protein synthesis continued during HS. However, these proteins differ from the proteins synthesized in the presence of GA3. We have found that the addition of ABA following 12h of GA induction results in the synthesis of both ABA-inducible proteins and GA_3-inducible proteins such as alpha-amylase. Preliminary data indicate that these aleurone layers continue to synthesize and secrete alpha-amylase during HS. This suggests that ABA-induced stress proteins may provide thermoprotection to the synthesis of GA_3-induced secretory hydrolases. We are currently examining the effect of HS on secretory protein mRNAs and ER ultrastructure in these layers.

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MESSENGER RNA STABILITY AND MEMBRANE PHOSPHOLIPID COMPOSITION IN HEAT STRESSED BARLEY ALEURONE CELLS. *Paul A. S. Benson* and *Mark R. Brodl*, Department of Biology, Knox College, Galesburg, IL 61401. Barley aleurone cells treated with gibberellic acid (GA_3) synthesize and secrete a battery of hydrolytic enzymes on ER-bound ribosomes. Heat shock (40°C) results in the selective suppression of secretory protein synthesis, due primarily to the selective destabilization of secretory mRNA and dissociation of the ER lamellae upon which these proteins are translated. Non-secretory protein synthesis continues unaffected, and a novel set of heat shock proteins (hsps) is induced. We have observed by SDS-PAGE, however, that if aleurone cells are subjected to heat stress, that is brought from 25°C to 40°C gradually by increments of 2.5°C every 30 (fast ramp) or 60 (slow ramp) min, the synthesis of secretory proteins was sustained at 50% of control levels as compared to less than 5% in heat-shocked samples. Using alpha-amylase as our secretory enzyme of study, we report on the differences between the stability of secretory protein mRNA pools in heat-stressed and heat-shocked samples as seen by northern hybridization analysis and the corresponding rates of protein translation as seen by SDS-PAGE. In addition, the transcription inhibitor cordycepin was used to inhibit hsp synthesis during heat stress, and our data indicate that alpha-amylase mRNA levels were thermoprotected even in the absence of hsps. We have previously shown using TLC that heat-shocked barley aleurone cells have a marked increase in the relative amount of phosphatidylcholine, the principal phospholipid of the ER. It is also known that heat stress results in an increased ratio of saturated to unsaturated fatty acids in membrane phospholipids, indicating during heat stress that alterations in membrane fluidity may be important in achieving thermal stability.

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THE HEAT SHOCK RESPONSE OF STYLE TRANSMITTING TISSUE IN PETUNIA. Kathryn A. Parsons and Mark R. Brodl, Department of Biology, Knox College, Galesburg, IL 61401. When exposed to elevated temperatures, organisms produce heat shock proteins (hsps) while suppressing the synthesis of normal cellular proteins. In barley aleurone layers heat shock results in a selective suppression of secretory protein synthesis, while the synthesis of nonsecretory proteins continues and hsp synthesis is induced. The suppression of secretory protein synthesis is due to the destabilization of secretory protein mRNAs and the dissociation of the stacked ER lamellae upon which these mRNAs are translated. We were interested in whether a similar mechanism could be responsible for heat-induced changes in pollination, both in the loss of self-incompatibility and aborted pollen tube growth. Self-incompatibility occurs in stylar transmitting tissue where the growth of incompatible pollen tubes is arrested, putatively due to the presence of secreted stylar (S-allele) polypeptides. Elevated temperatures can neutralize the incompatibility response, resulting in a state called pseudo-self compatibility. Growth of the pollen tube is sustained by nutrients liberated from the enzymatic digestion of storage products along the style's transmitting tract tissues. This digestion is accomplished by hydrolases secreted by the transmitting tissue. Heat shock-induced inhibition of secretion in stylar tissues could provide a mechanism underlying both the loss of self-incompatibility and poor pollination. We will report on our development of a system for studying this response in *Petunia hybrida* style tissues. The effect of heat shock on secretory protein synthesis will also be presented.

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EPSTEIN-BARR VIRUS: THE ROLE OF CD 45 IN LYMPHOMA DEVELOPMENT. Anjali Adukia, Illinois Mathematics and Science Academy, Aurora, IL 60506. The immune system plays a limited role in preventing cancer. While most patients with immunodeficiency do not succumb to common cancers (*e.g.* lung cancer), there are cancers (lymphomas) that are more common in the immunosuppressed. Epstein-Barr virus (EBV) has been associated with many lymphomas in immunosuppressed individuals. Immunodeficient (SCID) mice inoculated with EBV-infected also usually develop lymphomas. However, when the inoculated EBV-infected cells are of marmoset origin, lymphomas do not develop. Therefore, the EBV-infected marmoset cell must lack a factor necessary for lymphoma development–one that is present in human EBV-infected cells. CD 45 is an antigen not present in EBV-infected marmoset cells, but present in human EBV-infected cells. Its protein product may play a role in lymphoma development. We introduced the gene for CD 45 into EBV-infected marmoset cells. We will check for CD 45 expression and score for lymphoma development in SCID mice. This should provide an indication as to whether CD 45 is related to lymphoma development in immunosuppressed patients.

50

METHYLATED ANALOGS AS POTENTIAL SUBSTRATES FOR COPROPORPHYRINOGEN OXIDASE. T.A. Kaprak, L. Shen, T.D. Lash, AND M.A. Jones, Illinois State University, Normal, IL 61790-4160. Heme, a porphyrin derivative, is an iron-containing prosthetic group that is an essential component of many proteins, such as hemoglobin and the cytochromes. The biosynthesis of heme is a complex multistep pathway requiring the efforts of eight enzymes. Copro'gen Oxidase (C.O.) is one of the last three enzymes in the pathway and is one of the least understood. C.O. converts copro'gen-III to proto'gen-IX through two oxidative decarboxylation of the A and B ring propionic side chain moieties. Using chicken red blood cell hemolysates (CBH) as a source of C.O., different substrate analogues were incubated to evaluate the ring substituent effects on metabolism. Porphyrins with alpha- or beta- methyl propionate side chains have been synthesized via a,c-biladiene intermediates. These novel structures are being used as mechanistic probes for the active site of C.O. Preliminary biosynthetic studies with two beta-methyl propionate porphyrinogens have been carried out and these results demonstrate that the modified structures are poor substrates under the incubation conditions investigated. Additional analogues are being evaluated for their effects on metabolism. (Funded in part by NIH).

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SUBSTRATE SPECIFICITY OF MALATE DEHYDROGENASE. James A. Rardin , S. Kirk Wright, Marcus Sherman, Anjali Adukia, Kevin Hughes and Norbert C. Furumo, Department of Chemistry, Eastern Illinois University Charleston, Illinois 61920. Malate dehydrogenase (MDH), a key enzyme in the tricarboxylic acid cycle, catalyzes the reversible oxidation of malate to oxaloacetate in the presence of nicotinamide adenine dinucleotide cofactor. One way in which to gain a better understanding of an enzyme's catalytic properties is to substitute for the substrates compounds with similar structural features but are deficient in one key functional group. We have determined the effects of several substrate analogs on the activity of MDH. Analogs of malate and oxaloacetate studied include hydroxymalonate, ketomalonate and malonate. In addition, we have determined whether the enzyme will accept the D isomer of malate as a substrate in the reaction as well as the effect of citrate and ATP as inhibitors versus NAD^+ and NADH. Not surprisingly, our results indicate that MDH is highly specific for its substrates. The inhibition constants, K_i's, calculated for the above mentioned compounds were all in the millimolar range indicative of relatively low affinity for the enzyme.

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SONOCHEMICAL REACTIONS OF NITRITE. M. K. Peterson and E. B. Flint. Bradley University, Peoria, IL 61625. Nitrite (NO_2^-) is an important component in many applications. Its reactions in aqueous solution under the influence of ultrasound are expected to be primarily oxidation reactions due the production of hydroxyl radicals by the ultrasound. At low concentrations of nitrite (0.2 - 1 ppm) under an air atmosphere the nitrite concentration increases due to the formation of nitrite from N_2 and O_2. At higher concentrations (1000 ppm) the nitrite concentration decreases, with 20 to 85 percent depletion after 10 hours of exposure to ultrasound. Nitrate is the primary product, as determined by both a cadmium reduction procedure and by reaction with xylenol. The gases NO and NO_2 were not detected by FTIR.

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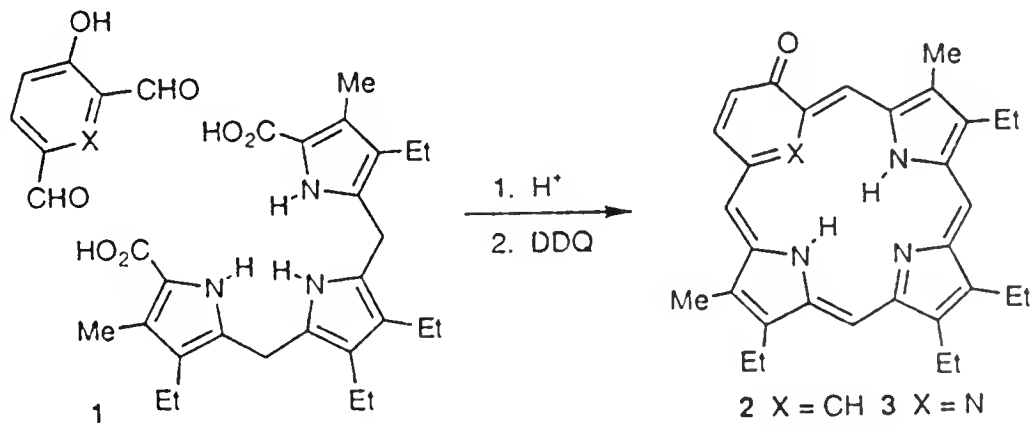
SYNTHESIS OF THE FIRST FULLY AROMATIC PORPHYRIN ANALOGS WITH BENZENE OR PYRIDINE SUBUNITS. Sun Chaney and Timothy D. Lash, Department of Chemistry, Illinois State Univ., Normal IL 61790-4160. Porphyrin analogs with furan or thiophene rings replacing one or more of the pyrrolenic subunits have been known for many years, but no examples of fully aromatic structures of this type with benzene or pyridine components have been described. Recently, we demonstrated that 5-formylsalicylaldehyde condensed with tripyrrane **1** in the presence of an acid catalyst to give, following oxidation with DDQ, the highly conjugated macrocycle oxybenziporphyrin **2**. The aromatic nature of this structure has been confirmed by IR, proton NMR, carbon-13 NMR, EIMS and uv-vis spectroscopy. Oxybenziporphyrin represents a truly unique system and is likely to exhibit unusual reactivity and coordination chemistry. The synthesis of the related pyridone system **3** is currently underway.



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54

THE SYNTHESIS OF α–DICARBONYL MONO- AND DIOXIMES AND CONJUGATED ANALOGS. *K. J. Steenberg, P. Kovacic, B. J. Andersh, and K. W. Field*, Department of Chemistry, Bradley University, Peoria, IL 61625. A number of physiologically active oximes have been reported in the literature. These oximes might represent models for in vivo imines. It is believed that imines are formed by the condensation of amino groups, from proteins, with β-lactam antibiotics during the antibiotic's ring opening. We wish to report the synthesis of a series of acyclic and cyclic mono- and dioximes in which the functional groups are both conjugated and isolated. Through an electrochemical study at physiological pH and under acidic conditions, we hope to relate oxime structure to the ability of these materials to participate in electron transfer.

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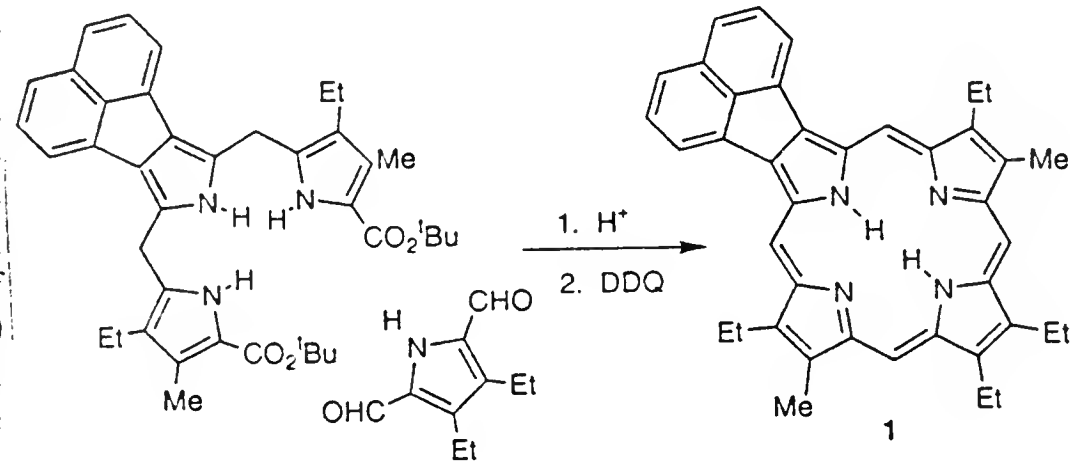
SYNTHESIS OF ACENAPHTHOPORPHYRINS. Pushpa Chandrasekar and Timothy D. Lash, Department of Chemistry, Illinois State University, Normal IL 61790-4160. Recent studies in this laboratory have resulted in the first syntheses of porphyrins with fused naphthalene, phenanthrene and phenanthroline subunits. Surprisingly, while the porphyrin electronic spectra for these systems are perturbed, the bathochromic shifts involved are relatively small (≤10 nm). This is unfortunate, because porphyrins with red shited chromophores have potential application in the area of photodynamic therapy (PDT). In this paper, the preparation of an acenaphthoporphyrin **1** is reported using a "3 + 1" synthetic strategy. The presence of the acenaphtho unit causes far greater shifts (>30 nm) in the electronic spectra than had been observed previously, suggesting that this system may have value as a photosensitizer in PDT.



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FREE RADICAL ADDITION REACTIONS OF 2,4-PENTADIENYLTRIBUTYLTIN. Annette Fernandez and Brad Andersh. Department of Chemistry, Bradley University, Peoria, IL 61625. Allyltributyltin has been shown by Keck to undergo addition reactions with alkyl radicals.[1] It has also been shown that substituents at C-3 inhibit the addition reaction.[2] We have found, however, that with an ethenyl substituent at C-3, addition still occurs, but the addition occurs exclusively at C-5. Therefore, this reaction provides a convenient route to highly substituted dienes.

1. G.E. Keck, J.B. Yates *J. Am. Chem. Soc.* **1982**, *104*, 5829.
2. D.P. Curran *Synthesis* **1988**, 489.

57

FRIEDEL-CRAFTS ALKYLATION: AN EXPERIMENT ILLUSTRATING SEVERAL REACTION PARAMETERS. *K. D. Erlinder, K. E. Kolb, and K. W. Field,* Department of Chemistry, Bradley University, Peoria, IL 61625.
The Friedel-Crafts reaction, alkylation of aromatic substrates, is a well known and thoroughly studied process. We have devised an experiment, for use in the introductory organic laboratory, which illustrates a number of the parameters involved in the reaction. Specifically, *p*-xylene, *p*-diethylbenzene, mesitylene, and *p*-chlorotoluene were alkylated by treatment with 1- and 2-halopropane (X= Cl, Br, I) in the presence of aluminum chloride. The mechanistic implications, derived from product studies, involving the identity of the leaving group, the basicity of the aromatic nucleus, the nature of the alkyl cation, and the reaction temperature will be presented.

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ACETONE: AN ALTERNATIVE SOLVENT FOR BROMINATIONS. Drew Murphy, Ryan Olson, Kurt Field, and Brad Andersh. Department of Chemistry, Bradley University, Peoria, IL 61625. It is well known that N-bromosuccinimide is an effective reagent for both electrophilic and free radical brominations. One drawback of these reactions, however, is that carbon tetrachloride and benzene are two of the more commonly used solvents. Although high yields are often obtained using these solvents, both solvents are environmentally unfriendly. We have found that acetone is a suitable replacement for these solvents for electrophilic substitution reactions with electron rich aromatic substrates and for benzylic free radical substitution reactions.

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CONVOLUTION PRODUCTS AND COMPOSITION ALGEBRAS.
P. J. C. Lamont, Western Illinois University, Macomb, IL 61455. Many arithmetic subsystems [1, 2, 3] of composition algebras have been discovered. Practical applications of the convolution products for the algebras will be discussed using inverses, heuristics and other techniques.
[1] Leonard E. Dickson, Algebras and Their Arithmetics, London New York New York (1923, 1960) and other references.
[2] P. J. C. Lamont, Factorization and arithmetic functions for orders in composition algebras. Glasgow Math. J. 14 (1973), 86-95.
[3] P. J. C. Lamont, Unique factorization in Cayley arithmetics and cryptology. Glasgow Math. J. 33 (1991), 267-273 and other papers and references.

60

AUTOMATED IMPLEMENTATION OF SIMPLEX ALGORITHM USING SPREADSHEET. Sajalendu Dey,. Parks College, Cahokia, IL. This paper addresses the general issues involved in the spreadsheet implementation of the simplex algorithm and then identifies some of the software engineering aspects in the automation of this implementation.

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FUZZIFYING THE BACKPROPAGATION MODEL. C.J. GALE, Western Illinois University, Macomb, IL 61455. Fuzzy logic allows us to handle "real world" problems which are often imprecise and uncertain. The backpropagation model is one of the most popular models of neural networks. By adding fuzzy logic to the back propagation model, more real world situations are able to be examined. This paper looks at the effect of fuzzifying the input of a backpropagation model. Fuzzifying input shows promise for decreasing learning time. It, also, localizes the expected learning time by significantly decreasing the standard deviation associated with multiple training sessions.

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A YEAR LONG COURSE IN SOFTWARE ENGINEERING: OUR EXPERIENCE. Adel M. Abunawass. Western Illinois University, Department of Computer Science, Macomb, Illinois 61455. Internet: mfama@uxa.ecn.bgu.edu. Theresia G. Fisher & Annette Schoenberger. Saint Cloud State University, Department of Computer Science, Saint Cloud, Minnesota 56301. Traditionally a software engineering (SE) course is taught over one three/four hours quarter/semester. Such a course has its limitations. One limitation is that the project has to be of a limited scope & complexity where it is possible for a single student to complete the project without the help of the rest of the team. Another limitation is that the course would normally emphasis one phase of the SE process. We have found that a year long series of SE courses can overcome most of the limitations of the traditional approach to teaching SE. The focus & emphasis of the course are speared over the entire engineering process. A project solicited from industry has 'real-life' flavor, complexity, time constraints, customer demands, etc. Such a project requires an intellectual commitment as well as faithfulness to the SE process by the students & instructor alike. The talk covers the course outline, the project(s), team formation & group dynamics and many lessons learned from teaching the course.

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A CASE STUDY IN OBJECT-ORIENTED PROGRAMMING, A. Dayama, A. M. Abunawass and L. Leff, A curses-based software was developed to allow novice users to access internet functions on a UNIX computer. This software included hierarchical menus and a browser function. The latter capability allowed the user to scroll through lists of interesting sites on the information superhighway to visit. It also allowed the user to edit, download and delete files in their UNIX account. The software was developed in the **C** language and put into production use. Later, the software was reengineered using object-oriented techniques and the **C++** language. The new software performed identically with the old software. The original software and the C++ version were compared using Lines of Code, the Halstead Complexity metric and the McCabe cyclomatic metric. All three showed improvement after the reengineering effort.

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A SCHEDULING EXPERT SYSTEM FOR ASSIGNING STUDENT LAB ASSISTANTS TO ACADEMIC COMPUTING LABS, O. Gottwald and H. Soegiyono and D. Pomatto and A. Abunawass and L. Leff, Western Illinois University, Macomb IL 61455. The Academic Computing Department staffs eleven different labs using a pool of 72 part-time students. The software ensures that students are not scheduled when they have class and considers other student preferences as to times that they are assigned to work. The software also takes into account of the total number of hours of work that the student requested. Other considerations include transportation between labs and matching of students' skill set and the needs of the laboratories. Conflicts between student preferences are resolved on a priority basis based upon performance in the previous semesters. The software has been tested on real-life data. It schedules the students in a few minutes of computer time. This compares with several days being taken to do the same job by hand. An X-Windows interface and database are interfaced to the expert system to provide a professional product.

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USING GENETIC ALGORITHM TO LAYOUT PATTERNS ON MATERIAL FOR THE GOLF-BAG INDUSTRY, R. P. Chiew and L. L. Leff and A. M. Abunawass, Western Illinois University, Macomb IL 61455 and R. J. Flynn, Polytechnic Institute of New York, Brooklyn, NY 11201. Genetic algorithms were used to solve the irregular cutting-stock problem. This work shows the feasibility of using a straightforward coding system for the positions of the object and its rotational orientation. Furthermore, we show a novel mutation operator--inspired by the work on simulated annealing. The system produces feasible pattern layouts. These layouts have wastage comparable to those produced by the experts working at the factory. Running time for the program is eight times slower than human experts on an IBM-PC compatible 486.

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AN EXPERT SYSTEM TO USE THE ELLIOT WAVE FOR FUTURE'S PRICING, O. Gottwald and L. Leff, Western Illinois University, Macomb IL 61455. The Elliot Wave is a method for predicting the performance of stock prices and other financial indices. It was developed in the 1930's. The system is based upon a fractal model of price movements or waves within waves. The software takes as input the price as a function of time, and determines the wave structure in the time series data using a series of expert system rules. A graphical interface based upon X-Windows was also developed and interfaced to the LISP program that applies the theories of R. W. Elliot. The system has been successfully run upon several test inputs.

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NASA'S CASEA SIMULATION ENVIRONMENT AND A PROPOSED PC BASED VERSION. L.H. Tichenor and M.A. Edeen Western Illinois University, Macomb, IL 61455; Johnson Space Center, Houston, TX, 77058. NASA's JOint VEnture (JOVE) program sponsored a 10 week research internship at Johnson Space Center Houston. Simulations were developed and run in CaseA, an environmental control and life support simulation program. Two models were developed, the first to test for the maximum leakage rate in a semi-closed growth chamber to still allow the collection of valid gas exchange information. The second simulation tested if the variations in oxygen concentration within a crew cabin would be different if system controls monitored O2 level or CO2 level. Difficulties with the CaseA environment led to a proposal to rebuild the system for PC/Windows domain.

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PRELIMINARY RESULTS OF A COAL CONVERSION FACILITY ON AMBIENT AIR QUALITY IN CHARLESTON, ILLINOIS. S. Rundle and V.P. Gutowski, Eastern Illinois University, Department of Geology/Geography, Charleston, IL 61920. One major component of the environmental quality of an area is the ambient air quality, measured, in part, by the amount of suspended particulates in the air. Coal burning facilities can have adverse effects on the air quality of an area. Data on total suspended particulates (TSP) has been collected in Charleston since 1985. A small sample of days when coal was burned at the EIU steam plant was compared with similar days over the past 10 years. Results indicate no significant increase in TSP for days when coal is burned, suggesting that filter units capture the majority of particles produced by coal burning.

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LAKESHORE RESTORATION USING ENHANCED SHORELINE VEGETATIVE TECHNIQUES. V.P. Gutowski, A. Alford and M.I. Czako, Eastern Illinois University, Department of Geology/Geography, Charleston, IL 61920. Through funding from several EPA Clean Water Grants, the City of Charleston has been able to undertake lakeshore erosion mitigation projects. Shoreline cliff retreat in the soft glacial sediments averages one foot per year with 39% of the shoreline suffering severe or moderate erosion and 27% with low erosion. Sediments eroded from the cliffs increase turbidity and provide nutrients which cause algal blooms. Live vegetative buffer zones will serve to lessen the impact of wave erosion at the base of the cliffs, reducing the amount of sediment delivered to the lake. Submersed vegetation will compete with algae for available nutrients, lowering algal blooms. Plants used include sandbar willow, baldcypress, water willow and burreed.

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LIQUEFACTION FEATURES AS EVIDENCE OF PREHISTORIC EARTHQUAKES. McNulty, W.E., Eastern Illinois University, Department of Geology/Geography, Charleston, IL. 61920. Under the proper conditions, intense seismic shaking of conformable sediments causes liquefaction of unconsolidated sand and gravel at or below the water table, when capped by a clay or otherwise impermeable layer. In the summer of 1995, a survey of river, stream, and ditch banks was conducted in central Illinois as part of continuing research on Illinois tectonic history. This research resulted in the discovery of sand and gravel dikes, sand and gravel sills, and sand blows, caused by earthquake-induced liquefaction. The liquefaction feature's age, location, and dimensions are utilized to estimate the date, epicenter, and magnitude of prehistoric earthquakes.

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VENATION PATTERNS IN SOME EARLY *GLOSSOPTERIS*. Richard L. Leary, Illinois State Museum, Springfield, IL 62706. The form-genus *Glossopteris* was established by Brongniart in 1828 for leaves with a thick midrib and anastomosing veins. Glossopterids were the dominant plants in Gondwana during the Late Permian. They characterized the plant assemblages and gave their name to the flora of the time. Although the genus *Glossopteris* is characterized by anastomosing secondary venation, the oldest known forms placed within this form-genus often have only rare cross connections between adjacent parallel secondary veins or possibly none. At least some of the taxa placed within the form-genus probably evolved from plants that bore leaves with dichotomously branched secondary veins.

METEORITES FROM MARS: THE CONTROVERSY CONTINUES. T.W. Boomer and C.T. Ledvina, Northeastern Illinois University, Chicago, IL 60625 and P.P. Sipiera, Harper College, Palatine, IL 60067.

The parent body for most meteorites is believed to be found in the asteroid belt or from asteroids that cross the orbits of the inner planets. Two noteable exceptions exist. The first is a group of lunar meteorites that match material brought back from the Apollo missions. The second group is believed to have come from Mars. These 10 to 12 "martian" meteorites exhibit distinctive characteristics that compare well to soil data returned by Viking. On the basis of trapped gas content, certain elemental ratios, their recent crystallization ages, and similarities in geochemistry and water content, they compare well. A concensus among planetary scientists accepts a martian origin for these meteorites without the benefit of a martian rock for definitive comparison. Other alternative theories suggest possible origin as ejected earth debris from giant impacts, or from exotic asteroids.

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NEW TECHNIQUES IN LIQUID CRYSTAL THERMOGRAPHY APPLICATIONS. M.R. Kulkarni and R.P. Brady, Southern Illinois University, Pulsed Video Thermography Lab, Carbondale, IL 62902-6603. Research performed by the authors has led to advances in the state-of-the-art of liquid crystal thermal nondestructive testing of materials. An introduction to the theory will be followed by example applications for a variety of materials and test scenarios. Emphasis will be given to quantitative characterization of material thermal properties and defects. Results and comparison to more traditional methods indicate the new techniques show promise as an accurate, inexpensive, on-line quality assurance tool.

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WATER QUALITY IN THE GRAND POINT CREEK WATERSHED, WASHINGTON AND CLINTON COUNTIES, ILLINOIS: EFFECTS OF OIL-FIELD ACTIVITIES. D. Ralston, C. Campbell, and A. Stueber, Southern Illinois University, Edwardsville, IL 62026.

Streamwater samples were collected and streamflow measurements were made at monitoring stations along Grand Point Creek (GPC) and major tributaries on three occasions, which included low-flow and high-flow conditions, during fall 1993. Streamwater was analyzed for 12 chemical species; Na, Cl, and Mn occurred at significantly elevated concentration levels in most samples. The mass discharges (fluxes) of these elements in GPC increased steadily as the stream flowed past Irvington oil field. Further downstream, Sewer Creek, the major tributary of GPC, provided equally large mass fluxes of the elements. Much of the Na, Cl, and Mn entered Sewer Creek through a conduit that transmits surface runoff from the city of Centralia, where active oil wells are located. The large mass fluxes of Na, Cl, and Mn through the GPC watershed can be attributed to leaching of salt deposits and soil near oil wells by surface runoff and groundwaters. Using data from a USGS monitoring station on Crooked Creek just below confluence with GPC, GPC contributed an average of 30% of the Na mass flux, 20% of the Cl mass flux, and 11% of the Mn mass flux in Crooked Creek. Crooked Creek, which flows through a region of extensive oil-field activity, discharges extremely large quantities of Na, Cl, and Mn to the Kaskaskia River below Carlyle.

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WATERSHED MONITORING FOR NITRATE VARIABILITY IN THE VERMILION RIVER WATERSHED. D.R. Mayer and L.L. Keefer, Illinois State Water Survey, Office of Sediment & Wetland Studies, Champaign, IL 61820-7495. A watershed monitoring network has been established and variations in nitrate concentration are being observed in the Vermilion River Watershed (a public water supply for the cities of Pontiac and Streator, IL). Spatial and temporal variations in concentration are being related to different land-uses, variations in precipitation, and other basin characteristics. Preliminary results conform to previously observed seasonal trends in nitrate concentration and suggest that seasonal variations in precipitation may influence peak concentration values. However, results to date have been strongly influenced by consecutive wet ('93) and dry ('94) water years.

LAND REHABILITATION OF THE MCKENNA HILL DROP ZONE, FORT BENNING, GEORGIA: SURVEY OF THE SPONTANEOUS VEGETATION. J.R. Rastorfer, Chicago State University, Chicago, IL 60628 and S.D. Zellmer, Argonne National Laboratory, Argonne, IL 60439. The forested 640-acre McKenna Hill Drop Zone (site) was cleared in 1988 for paratroop training. Trees were harvested and stumps were grubbed and buried. Subsequently, most of the site was graded to flatten hill tops and to fill in ravines, which mixed non-harvested vegetation, litter, duff, and topsoil with subsoil and left extensive bare areas. Because no efforts were made to establish a plant-ground cover following the grading operations, the exposed soils were subjected to severe erosion. Deep gullies developed, and eroded sediments accumulated in lowlands and in adjacent forest stands, causing the death of trees and understories. The objectives of this project, initiated in 1991, were to reduce runoff water velocity, increase vegetational cover, and periodically evaluate the site's ability to support spontaneous vegetation. Floristic reconnaissances were made in July 1993 and May 1994, mainly on uplands and slopes of the site. At present, 131 species are recognized, consisting of 15% trees, 17% shrubs, 5% brambles, 12% vines, 37% forbs, and 14% graminoids. Relatively abundant species across the site are *Carya pallida, Diospyros virginiana, Quercus marilandica, Quercus nigra, Sassafras albidum, Rhus copallina, Yucca filamentosa, Rubus cuneifolius, Rubus flagellaris, Smilax bona-nox, Coreopsis major, Erigeron strigosus, Eupatorium compositifolium, and Danthonia sericea.* Also, collectively, several species of *Lespedeza* are relatively common. Our observations indicate that the site has the potential to allow the establishment and development of a rather rich native flora, provided that soil erosion is arrested.

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THE INCIDENCE OF THE LYME DISEASE SPIROCHETE, BORRELIA BURGDORFERI, IN TICK VECTORS OF MISSOURI AND ILLINOIS. I.Bruno and C.Santanello. Southern Illinois University at Edwardsville, Illinois, 62026. In a further attempt to identify the tick vectors of the Lyme disease spirochete Borrelia burgdorferi in Missouri and Illinois, over 2,000 ticks have been collected by dragging in low vegetation and from a variety of hosts. Midgut smears are stained by the indirect fluorescent antibody (IFA) test, using H5332 as the monoclonal anti-Borrelia burgdorferi. Approximately 1% of the ticks collected have been found positive or putatively positive. Polymerase Chain Reaction (PCR) is also used to substantiate the IFA identification of the spirochetes as B. burgdorferi. We are also attempting to culture the spirochete by modifications of the BSKH medium. It appears that the spirochetes from these area have special nutritional requirements that are not provided by BSKH media or perhaps we are dealing with a different Borrelia strain in this area.

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CONSPECIFICITY OF LYME DISEASE TICK VECTORS OF THE GENUS IXODES. J. Mehranfar and C. Santanello. Southern Illinois University at Edwardsville, Edwardsville, Illinois 62026. In 1979, Ixodes scapularis, the black-legged tick, was found to be the principal vector of a disease that was soon to be known as Lyme disease. This tick was known from roughly the eastern half of the United States. Due to morphological differences the northern and southern populations were separated into two distinct species: Ixodes scapularis in the southeast and I. dammini in the northeast. In 1993, based mainly on morphometrics and assortive mating studies, both types were once again considered I. scapularis. Southern populations of this tick rarely parasitize humans, whereas northern populations do. This and other behavioral differences have led some researchers to believe that these are, in fact, two separate species. We are examining adult ticks from IL, FL, MA, and CT using the SEM. By comparing key external features such as spiracular plates, hypostome length, and coxal spurs, major differences may be found. This, coupled with PCR, may support the heterospecificity of this important tick vector.

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A NEW METHOD TO OBTAIN FIBRIN-PLATELET MATRICES IN THE CONTINUED STUDY OF CANDIDAL ENDOCARDITIS. M.E. Parks and D.J. Kitz. Southern Illinois University at Edwardsville, IL 62026-1651. **Endocarditis caused by *Candida* species often involves colonization of fibrin-platelet vegetations present on previously damaged heart valves. These infections are being seen with increasing frequency and are usually fatal even with existing antifungal therapies. *In vitro* models exist that allow the production of fibrin platelet vegetations, formed by increasing thrombin concentrations in freshly heparinized rabbit serum. Our improvement on this method involves irreversibly binding heparin with protamine sulfate in freshly pooled serum, greatly reducing the amount of thrombin needed for clotting. The ability of macrolide antibiotics such as azithromycin to boost macrophage killing of yeast targets on the clot surface was determined, and the effects of dissolving the drug in different solvents such as methanol or ethanol on their ability to boost yeast killing was examined.** **This work was supported by the Max Baer Heart Fund, Fraternal Order of Eagles.**

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HOST IMMUNE RESPONSE AND FUNGICIDAL ACTIVITY CAN BE EFFECTED BY MACROLIDE ANTIBIOTICS. D.J. Ufert, A. Spray and D.J. Kitz. Southern Illinois University at Edwardsville, IL 62026-1651. **Many antibacterial antibiotics which are known to penetrate host phagocytic cells have been found to boost immune responses including delayed-type hypersensitivity (DTH), antibody production and microbicidal activity. The class of antibiotics known as the macrolides including the parent compound erythromycin and more recently developed members including azithromycin and troleandomycin (Pfizer) and clarithromycin (Abbott) have been tested in our laboratory for their ability to boost DTH to the contact sensitizing chemical dinitrofluorobenzene and to enhance murine response to candidal yeast pathogens. Interestingly azithromycin was able to boost responses while clarithromycin depressed them, with the parent compound erythromycin behaving in an intermediate fashion. Studies on troleandomycin are currently underway. These results have shown that modifications of the macrolide molecule can cause great variability in how these compounds effect host immune response.**

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EFFECT OF THE SOMATOTROPIC AXIS ON TESTICULAR STEROIDOGENESIS IN HAMSTERS.
S.S. Oh, R. Khardori and *A.G. Amador* . SIU School of Medicine, Springfield. IL 62794-1315
Recently, information on the gonadal effects of the somatotrophic axis have become available. In the present study, adult hamsters were exposed to short-photoperiod, and injected with either somatotropin (GH), somatostatin (SRIH), or saline for eight weeks and then sacrificed. Testes were weighed, and fragments of similar size were incubated with or without hCG. No significant differences in the basal media testosterone (T) and estradiol (E_2) levels were observed among groups. Somatotropin potentiated the hCG-dependent increase in media T. Contrary to what was expected, treatment with SRIH did not only not reduce the hCG-related elevation in media T, but even produced a numerical potentiation of it. With respect to media estradiol, the inverse was true. Treatment with SRIH potentiated the hCG-dependent increase in media E_2, whereas treatment with GH produced only a numerical potentiation of the response. Furthermore, the combined exposure to SRIH and hCG caused a significant increase in the efficiency of testicular aromatase. Since previous data indicated that the combined deficiency of lactotropic and somatotropic actions severely impairs testicular steroidogenesis, treatment with SRIH should further impaired steroidogenesis. Since this does not appear to be the case, we postulate that SRIH has a direct stimulatory or at least a protective effect on testicular steroidogenesis. This is supported by the fact that SRIH is produced by the Leydig cell, and that other hypophysiotrophic peptides are produced by the testes and to exert actions on the Leydig cell.

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THE OPINION OF HIGH SCHOOL STUDENTS ON HEALTH CARE BENEFITS FOR THE FUTURE.

M.C. Persson jr and *A.G. Amador* . SIU School of Medicine, Springfield. IL 62794-1315

Problems with health care coverage affect everybody, but if current trends continue, it will be future generations that will suffer the most and will have to deal with these problems. Thus, we gave questionnaires to 273 juniors and seniors from Hersher High School. These were all the students, out of a total of 302, present at the High School on the two days the survey was conducted. The survey contained the same questions included in a survey sent to registered voters in Sangamon County. The overall demographic characteristics of this group of teenagers were similar to those of the voters in Sangamon County. Teenagers were asked which of a number of benefits they would like to have in their ideal health care plan. Teenagers felt an ideal health care plan should be based on a network of primary care physicians, with full referral capabilities to specialized services. Its benefits should include well-person coverage, preventive medicine, emergency care, prescription drugs, laboratory tests and catastrophic illness coverage. In contrast with adults, teenagers were adamant that, dental care, eye care and family planning be included in their plan. However, like adults they opposed coverage for elective abortion and elective medical procedures under their plan. Teenagers felt that funding of this plan should come from an income-based fee. They were against any additional taxes or fees being levied on them.

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PUBLIC OPINION ON HEALTH CARE BENEFITS FOR THE FUTURE.

M.C. Persson jr, *S. J. Verhulst* and *A.G. Amador* . SIU School of Medicine, Springfield. IL 62794-1315

Although health care reform legislation is in a hiatus, public concern with health care coverage continues unabated. Thus, 1% of registered voters in Sangamon County were sent a questionnaire, followed up by a telephone call if the mailing did not produce any results. Of a total of 450, 54 persons could not be located. Of the remaining 396, 77 declined to answer. Results were based on the remaining 319 answers. Persons were asked which of a number of benefits they would like to have in their ideal health care plan. Based on results, an ideal plan should be based on a network of primary care physicians, with full referral capabilities to specialized services. It should include well-person coverage, preventive medicine, emergency care, prescription drugs, laboratory tests and catastrophic illness coverage. If possible persons would like to see dental care, eye care and normal pregnancy care also included in their health care plan. Elective abortion and other elective medical procedures were generally opposed for inclusion in a plan. Respondents indicated that funding for full coverage should come from funds currently being paid by them into their current coverage, and directed into a general pool. Those unable to contribute should receive a basic coverage that would emphasize preventive medicine, and would be funded by sources such as "sin taxes".

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A HEALTH CARE PLAN FOR UNIVERSAL COVERAGE IN ILLINOIS.

A.G. Amador and *M.C. Persson jr.* SIU School of Medicine, Springfield. IL 62794-1315

Any country needs to offer universal health care to its residents. However, the size of the USA makes this a daunting task. A more practical solution would be for each state to have their own system. We propose here a four-tiered system that would cover all health care needs of the residents of Illinois without a noticeable increase in cost. Using the current manpower (physicians and dentists), a four-tier health care network could be established. It would consist of aproximately 2,300 Health Centers (primary care), 230 Clinics (secondary care), 35 Hospitals (terciary care), and 6 Medical Centers (quaternary care). It should be noted that within this system, "Clinics" would have a small number of beds. Thus, many of the small community hospitals in operation right now would serve in this "Clinic" capacity. Funding would come from a single fee, which would be comparable in amount to the average of what Illinois residents currently pay for their health insurance. This would entitle the insured to receive full health care coverage, with only the exclusion of elective medical/dental procedures. Retirees and dependents would receive the same benefits. The chronically unemployed would receive limited coverage. This would include emergency care, and would have a great emphasis on preventive medicine/dentistry. The funding for this would come from special fees/taxes, such as "sin taxes". Medical and other health sciences school would serve as the anchors for this system. The administration of this system would lie with an independent state-regulated foundation.

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QUANTITATIVE MEASUREMENTS IN BIOLOGICAL TRANSMISSION ELECTRON MICROSCOPY.

L.D. Spears, Ph. D., Dept. of Life Sciences, John A. Logan Community College, Carterville, IL 62918. *This work was supported in part by the American Heart Association, FW 01. In order to determine accurate values for surface area and volume in biological structures, stereoscopic reconstruction requiring the subsequent measurement of the thickness of sequential thin sections and their relative position within the object is typically the only option. This work presents a new method that does not require a determination of these parameters. Surfaces of revolution, surfaces that can be generated by revolving a particular curve about some axis, are shapes commonly observed in biological features. In such a case, the method proposed here uses a self-consistent protocol to determine structure using data measured solely from selected micrographs. As a test of this protocol, eight thin sections cut from a single human erythrocyte were recorded at 50 kilovolts, with high contrast, bright field mode, and 9,000X. Prints were digitized using a flat bed Microtek© GrayScale Scanner, MSF-3000Q. Computer images were processed and measurements were taken from prints using Digital Darkroom© and Wayne Oasband's NIH Image 1.43 software respectively. Data obtained from this process was fitted to the constants of a surface of revolution generating curve by the method of Marquardt (SAS Statistical Package) run on an-IBM 9020 mainframe. The method converged with $R < .9996$. If a shape turns out to be a poor surface of revolution, convergence naturally fails. In conclusion, this method reduces the amount of experimental data needed if the feature approximates a surface of revolution.

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EFFECTS OF THE EXTRACT OF ALLIUM CEPA ON THE INFECTIVITY AND MORPHOLOGY OF TOBACCO MOSAIC VIRUSES (TMV). Mike Miszczak, Karim Issa, Amrik S. Dhaliwal and Warren Jones, Department of Biology, Loyola University Chicago, Chicago, IL 60626. The tobacco mosaic virus is a single stranded RNA virus that is usually grown in Nicotiana tabacum. The best assay host for this virus is phaseolus vulgaris cv. Pinto. This research was initiated to assess the effects of the extract of Allium cepa on purified TMV. Allium cepa extract was prepared by grinding the Allium bulbs with a pestle and mortar, and centrifuging the extract at 15,000 rpm for 10 minutes. The supernatant was used for experimentation. The virus samples were treated with three doubling dilutions (0, 2, and 4 times) of the extract and incubated for three time intervals (0, 30, and 60 min). The samples were prepared for E. M. studies by staining the virus using 2% uranyl acetate. This study indicated that there were no changes in the morphology of the virus due to treatment with the extract. Further research needs to be conducted to confirm these results. The extract did inhibit the infection process of the virus by about 20 - 60 percent.

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THE DETERMINATION OF THE MECHANISM(S) OF BACTERIAL BIOLOGICAL CONTROL OF FUSARIUM DRY ROT. [1]M.L. Chase, [1]M.J. Boehm, and [2]D.A. Schisler, [1]Monmouth College, Monmouth, IL 61462, and [2]USDA-ARS National Center for Agricultural Utilization Research, Peoria, IL 61604. Previous research demonstrated the use of Enterobacter cloacae strains as effective biological control agents to control Fusarium dry rot of potato caused by Fusarium sambucinum. In these studies, biological control was most pronounced for E. cloacae strains capable of synthesizing a variety of antifungal metabolites. The goal of this research was to further our understanding of the genes involved in the biological control of Fusarium dry rot by E. cloacae. Transposon Tn5 mutagenesis of an antifungal metabolite producing strain of E. cloacae yielded approximately 6,000 putative *Tn5* mutants. All putative *Tn5* mutants were similar to the parental wild type strain in their ability to produce a volatile antifungal compound which effectively inhibits the germination of macroconidia produced by F. sambucinum. The foregoing suggests that the disruption of genes governing the expression of this volitle compound may be lethal. Twenty of the putative *Tn5* mutants displayed reduced motility as compared to the parental wild type strain.

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EFFECTS OF TWO NEMATODE PARASITES ON THE BEHAVIOR OF MICE (MUS MUSCULUS). K.E. Barger and K.L. Cramer, Monmouth College, Monmouth, IL 61462. Previous research has shown that some parasites can alter the response behavior of their intermediate host to environmental stimuli. Some studies note a reduction in activity of heavily infected hosts, increasing host susceptibility to predation thereby enhancing parasite transmission. When disturbed by a predator, reduced running speed and distance traveled by the host may lead to its immediate capture. We compared three measures of activity in laboratory mice, Mus musculus, infected with one of two nematode parasites, Trichnella spiralis or Nippostrongylus brasiliensis. As predicted, mice infected with N. brasiliensis showed no significant reduction in activity as this parasite is commonly transmitted through ingestion of food contaminated by soil and/or feces. Mice infected with T. spiralis, however, showed a strong reduction in activity, possibly as an adaptive mechanism for the parasite to ensure transmission of larvae encysted in the host's muscle tissues to potential predators.

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EFFECT OF DIFLUBENZURON ON GROWTH AND CHITIN CONTENT OF TWO ZYGOMYCETS. T.Dubey, Dept. of Plant Pathology, University of Wisconsin, Madison, WI. 53706. Effect of insect chitin synthetase inhibitor-Diflubenzuron (4L) on growth and chitin content of Mucor genevensis and Zygorhynchus moelleri was studied by growing these fungi in PYG broth medium supplied with different concentrations of Diflubenzuron and measuring the growth on 10th and 20th day of incubation. EM studies and chitin analysis of cell wall of Z. moelleri indicated a correlation between reduced and distorted mycelial growth and approximately 50% reduction in chitin content of cell wallsof treated cells. This suggests that morphological effects of Diflubenzuron on susceptible cells are caused due to its potent inhibition of chitin synthase which is visible on the growing hyphal tips burst or balloon.

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STUDIES OF ZINGIBER OFFICINALE EXTRACT TREATED CYANOBACTERIA WITH SCANNING ELECTRON MICROSCOPE AND ITS SUSCEPTIBILITY TO CYANOPHAGE INFECTION. Sarwath Khan, Amrik S. Dhaliwal, and Warren Jones, Department of Biology, Loyola University Chicago, Chicago, IL 60626. Zingiber Officinale extract was prepared by grinding it with pestle and mortar and passing it through cheese cloth. The filtrate was centrifuged at 15,000 rpm for 10 minutes and the supernatant was used for experimentation. Three doubling dilutions (0, 2, and 4 times) were used for treating the cyanobacteria and three incubation timings (0, 30, 60 minutes) were tested. Scanning electron microscope studies showed that the extract caused undetermined surface changes. Treatments did inhibit the susceptibility of cyanobacteria to cyanophage infection. It was hard to suggest with this preliminary work as to how the inhibition was caused. It is logical to say that the extract is probably blocking the receptor sites on cyanobacteria. In order to conform this observation further research needs to be done along this line.

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SCANNING ELECTRON MICROSCOPY OF CYANOBACTERIA TREATED WITH THE EXTRACT OF ALLIUM CEPA AND ITS SUSCEPTIBILITY TO CYANOPHAGE LPP-I INFECTION. Ali Valika, Amrik S. Dhaliwal, and Warren Jones, Department of Biology, Loyola University Chicago, Chicago, IL 60626. Cyanobacteria were grown in 250 ml flasks containing 100 ml nutrient medium. Cyanophage was grown in flasks containing cyanobacteria by inoculating the cyanobacteria with 1 ml of virus and incubating them at 21°C under 160 LU/Ft^2 light intensity for about three days. Extract of Allium cepa was prepared by grinding the bulbs with a pestle and mortar, and centrifuging it at 15,000 rpm for 10 minutes. Two fold dilutions of the supernatant were used for treating the cyanobacteria. The treated samples were then incubated at room temperature for 0, 30, and 60 minutes, and used to test the susceptibility of cyanobacteria to viral infection. The cyanobacteria were also checked for morphological changes under the scanning electron microscope. Susceptibility of cyanobacteria treated with extract is reduced to 70% - 80%. Morphological studies showed some surface abnormalities caused by the extract treatment. Further studies are needed to confirm whether the extract is involved in blocking the receptor sites on the surface of bacteria or uses some other mechanism for inactivation of the virus.

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MORPHOLOGICAL AND INFECTIVITY STUDIES OF CYANOPHAGE LPP-I TREATED WITH THE EXTRACT OF ALLIUM CEPA. Aris Musabji, Amrik S. Dhaliwal and Warren Jones, Department of Biology, Loyola University Chicago, Chicago, IL 60626. Extract of Allium cepa was prepared by grinding the bulbs with pestle and mortar. After passing through the cheese cloth the extract was centrifuged at 15,000 rpm for 10 minutes. The supernatant was used to study its effects on the infectivity and morphological changes in the cyanophage LPP-I. Two and four fold dilutions of the extract were made with saline solution and the cyanophage treated with these dilutions was incubated for 0, 30, and 60 minutes before testing for infectivity and morphological changes. A negative staining technique, using 2% uranyl acetate was used for studying the morphology of the virus. Infectivity of the virus was assessed by a plate count procedure using a mixture of 2 ml cyanobacteria, 0.5 ml cyanophage and 2.5 ml of 0.7% agar and over laying this on solidified 1.5% agar prepared in cyanobacteria nutrient medium. Infectivity studies showed that there was little or no inhibition of virus infection. Electron microscopy of the virus indicated some structural changes caused by the extract treatment.

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ELECTRON MICROSCOPY AND INFECTIVITY STUDIES OF CYANOPHAGE LPP-I TREATED WITH EXTRACTS OF ZINGIBER OFFICINALE. Hamada Yehya, Amrik S. Dhaliwal, and Warren Jones, Department of Biology, Loyola University Chicago, Chicago, IL 60626. Cyanophage LPP-I is double stranded DNA virus. This virus was discovered infecting cyanobacteria by Safferman and Morris in 1963. Previous work by some investigators have shown that Zingiber extracts inhibited the infectivity of cyanophage LPP-I when assayed with cyanobacteria. Present research was conducted to investigate if the extract of Zingiber is responsible for causing any morphological changes in the virus particles. Zingiber extract was prepared by grinding it with pestle and mortar and centrifuging it at 15,000 rpm for 10 minutes. The supernatant was mixed with the virus and the treated virus was then stained with 2% uranyl acetate for electron microscope studies. These preliminary studies did not conclusively show that there were any changes caused by the treatment. Research must continue to ascertain if the extract has any affect on the virus particles which causes the inhibition of its infection process.

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EFFECTS OF THE EXTRACT OF ALLIUM SATIVUM ON THE MORPHOLOGY AND INFECTIVITY OF CYANOPHAGE LPP-I. Asma Hashmi, Amrik S. Dhaliwal, and Warren Jones, Department of Biology, Loyola University Chicago, Chicago, IL 60626. Cyanophage LPP-I was treated with 2, 4, and 8 fold dilutions of the extract of Allium sativum. The treated cyanophage was incubated for 0, 30, and 60 minute time intervals at room temperature. Infectivity studies were performed at each dilution for incubation times of 0, 30, and 60 minutes, using cyanobacteria as an assay host. Allium sativum was obtained from the local vegetable market and the extract was prepared with a pestle and mortar. The extract was passed through cheese cloth and the filtrate was centrifuged at 15,000 rpm for 10 minutes. The supernatant was used for experimentation. The extract at all concentrations and at all incubation times inhibited the infectivity of cyanophage to around 50%. Electron microscopy indicated that the extract did cause some surface changes of cyanophage LPP-I. To confirm these findings more research in this direction needs to be done.

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STUDIES OF THE CHANGES IN CYANOBACTERIUM TREATED WITH THE EXTRACT OF ALLIAM SATIVUM AND ITS SUSCEPTIBILITY TO CYANOPHAGE LPP-1. Shumaila Ali, Amrik S. Dhaliwal, and Warren Jones, Department of Biology, Loyola University Chicago, Chicago, IL 60626. Allium Sativum was purchased from the local grocery store. The bulbs were peeled, weighed and ground with a pestle and mortar. The extract was centrifuged at 15,000 rpm for 10 minutes. The cyanobacterium was treated with the supernatant. Susceptibility of cyanobacterium and morphological changes in the bacterium were then analyzed. In the study, three dilutions of the extract (4, 16, and 32 times), and three incubation timings (0,30, and 60 min.) were used. It was found that the three dilutions of the extract were equally effective in inhibiting the susceptibility of the bacterium to cyanophage LPP-1 infection. Bacterium treated with the three dilutions of extract did show some morphological and surface changes. These changes are under further investigation.

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ALZHEIMER'S DISEASE: A LIGHTNING ROD FOR SCIENCE EDUCATION. N. R. Smalheiser, University of Chicago, Chicago, IL 60637. One of the greatest virtues of the ISAS Science, Mathematics and Technology Education Division is its cross-disciplinary nature. At the same time, this very diversity challenges the Division to identify compelling problems to draw its members together. One option is to organize a series of Divisional activities around Alzheimer's Disease (AD). AD is of great societal impact; is the subject of intense research activity ranging from peptide modelling to environmental science to microbiology; and appears to lack the stigma attached to cancer or AIDS. The Division could use the example of AD to help educate science students, allied health workers and the general public regarding the process of scientific discovery, and the relation of basic science to human (and humanistic) concerns.

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TEACHING CONSERVATION IN SCIENCE, MATH, AND TECHNOLOGY CLASSROOMS. R.N. Woll and S.J. Cryder, N. Woll & Co., Inc., San Jose, IL 62682. Conservation is vital to sustaining Planet Earth, to ensure a good quallity environment for future generations. By incorporating conservation into curricula and classroom practices for science, math and technology education at all levels - from Pre-primary through Post-Secondary - conservation can become part of the fabric of the lives and careers of all people and thereby preserve and improve the condition of the Earth's environment. This paper discusses the rationale for teaching conservation, suggests program goals and performance outcomes for curricula, and specific classroom practices in all subject areas.

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DEVELOPING INTEREST IN SCIENCE THROUGH SUMMER OUTDOOR ACTIVITY. M. L. Wilson-Comer, Chicago State University, Chicago, IL 60628. An outdoor summer science program for urban children in grades 6 through 10 will be described. Easy, simple, hands-on activities using inexpensive materials were used to help students understand basic biological concepts of morphology, anatomy, diversity, ecology, and systematics. Sunflowers, members of the Asteraceae family (Sp. Helianthus) found growing locally, were used to develop skills in observation, data collection, measurement, and chemical analysis. Individual projects and group games of competition made learning science a fun activity. A sample lesson plan will be provided.

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AGE STRUCTURE AND SURVIVORSHIP IN A LARGE MAMMAL: USING LIFE TABLES CONSTRUCTED FROM CEMETERY DATA TO TEACH BIOLOGY AND LOCAL HISTORY. Janice Capelle and Marian Smith, Wood River-East Alton Community High School, Wood River, IL, 62095; Southern Illinois University, Edwardsville, IL 62026. *Homo sapiens* is a large mammal that has the curious habit of aggregating dead individuals at particular sites. Furthermore, data on gender and dates of birth and death often accompany the deceased. Systematic data collection from such sites can yield appropriate information for an analysis of life history characteristics of a local population. Students can combine life history data with research into historical events which may have affected the life-span of specific groups of individuals. Two students from Wood River compared life expectancy of males and females in the community over the past two centuries, and correlated their data with local and world events: a local massacre of early settlers; wars; and important advances in medical care. The study required collection and analysis of data, and introduced students to historical research.

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THE IMPACT OF A COMMERCIALLY PREPARED SCIENCE PROGRAM ON ELEMENTARY SCHOOL DISTRICTS. **J.A. McGaughey, Eastern Illinois University, Charleston, IL 61920.** **A summative evaluation was conducted among 14 elementary school buildings to determine the impact a commercially prepared science program, Windows on Science, had on science education in grades K through 6. The components of this program include video disk technology, supporting materials for laboratory exercises and an ancillary language laboratory. The program was intended to be used solely for the science curriculum and all parts were to be equally utilized to improve elementary science literacy. Survey results, interviews and observations indicate: 1) teachers utilized the video disk more than the supporting lab materials or language laboratory 2) the program is used as a supplement to existing texts rather than as the sole curriculum guide.**

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GENDER BIAS IN EDUCATIONAL SOFTWARE: A CONTENT ANALYSIS OF SEX-ROLE STEREOTYPES E.M. AbuSharbain Southern Illinois University at Edwardsville, Edwardsville, IL 62026. A content analysis of sex-role stereotypes was conducted on 12 of the "best" educational software simulations from 1990 and 1991. Categories of stereotypic masculine roles and feminine roles were isolated from the Bem Sex-Role Inventory. The software was ranked as "Strong", "Moderate", or "Weak" in each category. Masculine roles of: 1) Dominance, 2) Analytic thinking, 3) Aggressiveness, 4) Independence, 5) Competition and 6) Bravery were found often and strongly rate. The final masculine role, Assertiveness, was found rarely. The only feminine role found was Loyalty. Feminine roles of 1) Affectionate, 2) Cheerful, 3) Flatterable, 4) Showing love of children, 5) Gentle, 6) Soft-spoken, and 7) Yielding were not found. It was concluded that educational software is biased for stereotypic masculine interactions.

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ECOLOGY, REPRODUCTION AND DEVELOPMENT OF OXYPORUS MAJOR GRAVENHORST, WITH A COMPARISON TO OTHER SPECIES OF OXYPORUS (COLEOPTERA: STAPHYLINIDAE). M. A. Goodrich, Department of Zoology, Eastern Illinois University, Charleston, IL 61920. The genus Oxyporus includes 14 species in North America, nine of which occur in Illinois. Larvae have been described for only six of the 14 species. In this paper I report the collection of adults and larvae of Oxyporus major Gravenhorst from the gilled mushroom Stropharia hardii Atkinson and the rearing of larvae to adults in the laboratory. Development is extremely rapid, with development from eggs to adults completed in 13-15 days. This is comparable to developmental rates reported earlier for O. stygicus, several other species of Oxyporus, and a number of fungus feeding Coleoptera in other families. Field observations that suggest female parental care are described.

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THE BRACHIACANTHA (COLEOPTERA: COCCINELLIDAE) OF ILLINOIS. H. W. Montgomery, and M. A. Goodrich, Department of Zoology, Eastern Illinois University, Charleston, IL 61920. This research was conducted to determine the species of the ladybird beetle genus Brachiacantha occurring in Illinois. Specimens were collected using Malaise traps, yellow sticky traps, sweep sampling, and visual collecting. U-V light trapping proved unsuccessful. Sixteen institutions and private collections provided additional specimens from Illinois for study. Six species were found to occur in Illinois: B. decempustulata, B. dentipes, B. felina, B. q. quadripunctata, B. rotunda, and B. ursina. The rarely collected B. indubitabilis was not found, but is likely to occur in Illinois. Adults are found on vegetation in deciduous forest habitats. Larvae of two species have been found as myrmecophiles in nests of the ant genus Lasius, where they feed on root coccids and root aphids. Nothing is known of the larvae of the other five species.

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FLUCTUATION OF MICROARTHROPODS IN FLOODPLAIN AND NONFLOODED SOILS. *Michael J. Morrisey* and *Gertraude Wittig*, Southern Illinois University, Edwardsville, 62026-1651. Microarthropods are the major component of soil fauna that comminutes organic matter for final bacterial and fungal decomposition. We attempt to elucidate their seasonal cycles in nonagricultural soils. Soil samples were collected in spring and summer 1994 at three floodplain sites along the Illinois or Mississippi River and three nonflooding comparison sites. Microarthropods were extracted using the Tullgren method. Most numerous in our samples were Collembola and mites. Collembola tended to outnumber mites in flooded or wet soils, whereas mites tended to outnumber Collembola in nonflooded or dry soils. Grassland burning reduced overall occurrence of both as did water-logging or flooding of soils. However, both types of events were followed by increases in microarthropod numbers, presumably because of increased availability of nutrients.

105

CONSTRAINT LINE THEORY AND SPECIATION. John L. Kriz and Dianne M. Jedlicka. Joliet Junior College, Joliet, IL 60436 and Augustana College, Rock Island, IL 61201. Constraint Line Theory has suggested that during periods of extensive environmental change, behavioral strategies less than optimal strategy can exist. If environmental changes also effect the efficiency curve for the behavioral strategies then the efficiency level for each behavioral strategy may rise or fall. One possible outcome is the forming of multiple peaks in the efficiency curve. Speciation may result from this reforming of the efficiency curve, when the environmental pressures re-establish the constraint line at higher levels. The upward movement of the constraint line will remove the lower efficient, intermediate behavioral strategies and leave only the peak areas of the reformed efficiency curve. Each peak would then represent a new species displaying a distinct behavioral strategy.

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THE EFFECT OF PATERNAL INVESTMENT ON AGING IN MALE GIANT WATERBUGS (*Belostoma flumineum*). Kipp C. Kruse and Matt R. Gilg, Eastern Illinois University, Charleston, IL 61920. The giant waterbug is an interesting species in that females deposit eggs on the backs of males who then brood these eggs until hatching. This is one of the few species in the Animal Kingdom that exhibits exclusive post-copulatory paternal care. Fifth instar nymphs were field captured and maintained in the laboratory until adult emergence. Males were randomly allocated to experimental groups that varied in amount of parental investment (virgins, bred twice, bred and brooded twice, bred three times, bred and brooded three times, bred five times and bred and brooded five times). After completion of the experimental treatments, males were isolated and maintained until death. Virgin males lived longer on average (200 days) than males that bred (180 days). In general, age at death decreased as paternal investment increased. The relationship of parental investment to evolutionary explanations of senescence will be discussed.

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REPRODUCTION AND EARLY LIFE HISTORY OF *PIPA PARVA* IN CAPTIVITY. **D.L. Plunk and J.E. Thomerson, Southern Illinois University at Edwardsville, Edwardsville, IL 62026-1651.** **Reproduction in *Pipa parva*, a small aquatic anuran from the Maracaibo Basin of Venezuela and Columbia, involves the incubation of fertilized eggs and development to tadpole stage on the dorsum of the female. The process begins with approximately 12 hours of inguinal amplexus during which the female's dorsal epidermis becomes tumescent. Eggs are extruded in batches, fertilized, and become attached to the female's back as the mating pair executes a series of mid-water turnovers. Nocturnal eclosion of developmentally advanced, 13 mm tadpoles occurs after 21 days. An average of 42 tadpoles hatch from the more than 200 eggs incubated in the brood pouch. Although in nature this species reproduces seasonally in temporary ponds, in our lab amplexus and egg-laying typically begin within 24 hours of brood hatching.**

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THE CODEVELOPMENT OF SKULL DERMAL BONE AND LATERAL LINE CANALS IN THE ALEWIFE (*ALOSA PSEUDOHARENGUS*). J.D. Ricken
Loyola University Chicago, Chicago, Il 60626. Codevelopment of the lateral line and dermal bone has been studied and mapped in many fish. This study is the first to specifically examine the codevelopment in the clupeomorph*Alosa Pseudoharengus*. I used histochemical and S.E.M. procedures to examine tissues in a developmental series of *A. Pseudoharengus* from 8.6 mm to 124 mm in length. I found various regions of the skull developed differently. Some sections of lateral line canals were first enveloped by cartilage and then by dermal bone, while other sections were encased in bone without the presence of cartilage. The study demonstrates that the lateral line canals develop differently in various regions of the skull. Some are covered by cartilage and then dermal bone, while others form solely in bone.

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MOVEMENT PATHWAYS OF GRASSHOPPERS AND HERMIT CRABS IN VEGETATED AND NON-VEGETATED AREAS IN COSTA RICA USING FRACTAL ANALYSIS. H. Kaneko, B. A. Middleton, T. Nakashima, and M. McKernan, Southern Illinois University at Carbondale, Carbondale, IL 62901. Movement patterns of grasshoppers in beach microlandscapes were studied with varying amounts of vegetation in Costa Rica using fractal analysis. Three-five m^2 sites were established on a non-vegetated beach and three in adjacent vegetated areas. Five hermit crabs were released successively in the center of each area and their movement patterns marked with stones every 20 seconds until the animal exited the area. Following the trial, the distances and directions moved in each 20 second interval were recorded. The experiment was repeated with grasshoppers. For hermit crab movement, the fractal dimension (D) was higher in vegetated areas rather than non-vegetated areas (2.0 and 1.03, respectively; $p < 0.05$) and also for grasshopper movement (2.0 and 1.25, respectively; $p < 0.05$). This indicates that for both hermit crabs and grasshoppers, movement patterns within vegetated areas were more complex presumably, because both species seek shade, food and protection from predators within vegetation.

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THE RELATIONSHIP OF EPIPHYTE LOAD, TREE SPECIES AND DISTANCE FROM COAST IN COSTA RICA. T. Nakashima, B. Middleton, H. Kaneko, and M. McKernan, Southern Illinois University at Carbondale, Carbondale, IL 62901. Epiphytes including orchids and bromeliads show distinct patterns of distribution depending on tree species and distance from the ocean. Epiphytes are less numerous on trees with peeling bark such as *Inga* sp. and *Citrus* sp. than on those without peeling bark (0, 7.0, 48.7 epiphytes per tree, respectively; $p < 0.05$). In secondary forest, epiphytes were absent on trees nearer the ocean (0-44 meters) but numerous inland (> 44 meters; 5.8 epiphytes per tree; $p < 0.05$). However, in more open forest, no relationship between distance from the ocean and epiphyte distribution was detected. Epiphyte distribution may be related to the availability of sunlight and the ability of the plant to attach to the tree. This depends on the extent of bark peeling of the tree species, and the position of the tree with regard to prevailing winds.

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SYZYGITES MEGALOCARPUS (ZYGOMYCETES, MUCORALES, MUCORACEAE) IN ILLINOIS. R. L. Kovacs and W. J. Sundberg, Department of Plant Biology, Mail Code 6509, Southern Illinois University at Carbondale, Carbondale, Illinois 62901. Occurring on fleshy basidiomycetes, Syzygites megalocarpus Ehrenberg: Fries (Zygomycete, Mucorales, Mucoraceae) has been collected from five Illinois counties (Cook, Gallatin, Jackson, Union, and Williamson). Voucher specimens of Illinois records of Syzygites megalocarpus are deposited at The Chicago Field Museum of Natural History, The Illinois Natural History Survey, Eastern Illinois University, and Southern Illinois University at Carbondale. Syzygites megalocarpus is now known to occur on at least 39 host genera of basidiomycetes in 18 different host families. Illinois collections include Syzygites megalocarpus on only nine host genera. Of these, three genera are known only from "lab grown" material--specimens collected in the field and appearing uninfected, but developing Syzygites megalocarpus after incubation in the laboratory. The ability of Syzygites megalocarpus to attack additional potential hosts was demonstrated with inoculation studies in the laboratory. Because of the much broader known distribution of potential hosts in Illinois, further attention to Syzygites megalocarpus would more fully document the hosts and geographic range of this Zygomycete in the State.

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THE LICHEN FLORA OF PUTNAM COUNTY, ILLINOIS. *R.D. Hyerczyk*, The Nature Conservancy, Volunteer Stewardship Network, Chicago, IL 60608. Field work from June 1991 to April 1995 has yielded a total of 74 species of lichens representing 37 genera in 18 families from Putnam County, in north-central Illinois. Thirty-seven species are of the CRUSTOSE growth form, 24 species are FOLIOSE and 13 species are FRUTICOSE. Thirty species are on CORTICOLOUS substrates, 19 are SAXICOLOUS, 15 are LIGNICOLOUS and 10 are TERRICOLOUS. Specimens and an annotated species checklist will be presented.

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SUCCESSIONAL PATTERNS IN TWO CENTRAL ILLINOIS OAK FORESTS AFTER SEVENTEEN YEARS. Danny J. Gustafson, Michelle M. Woodby, and Roger C. Anderson, Illinois State University, Normal, IL 61790-4120. Two oak forests, Breen's Woods and North Breen's Woods, in McLean County, Illinois, were examined to determine the pattern of tree species replacement over 17 years without fire or management. Data were collected regarding seedling, sapling, and tree densities; tree dominance; and importance values. Shannon-Weiner diversity indices were calculated. These results were compared to data collected on these sites in 1977. The tree stratum in both woods were dominated by white oak in 1977 and 1994. The oak species in these forests are not regenerating and are being replaced by shade tolerant mesophytic species. Sugar maple dominance of the reproductive strata in North Breen's Woods precludes management for oak species; we suggest management for sugar maple. Ironwood and black cherry dominate the reproductive strata of Breen's Woods; we believe that this site can be managed for an oak forest. White-tailed deer populations need to be reduced in these forests and surrounding areas, because of negative impacts on plant diversity attributed to abnormally large deer populations.

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TRANSGLUTAMINASE ACTIVITY IN VERTEBRATE EYE TISSUE. Dr. A. Baich and J. Powell, Southern Illinois University at Edwardsville, Edwardsville, IL 62026. Homogenates of chick embryo retinal pigment epithelium (RPE) tissue catalyze the attachment of radioactive putrecine to protein in the presence of calcium. The specific activity of the enzyme responsible for catalyzing this reaction, transglutaminase (TG), increases during the development of the embryo. TG activity in adult chicken RPE is much greater than in the embryonic tissue. The exact function of TG in RPE is not yet understood.

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Poly ADP-ribose polymerase in Chick Pigment Epithelium. A Baich and M. Mitchell Southern Illinois University at Edwardsville. Pigment epithelium cells irradiated with ultra-violet light respond by incorporating less tritiated thymidine than unirradiated cells. This decrease is reversed when poly(ADP-ribose) polymerase is inhibited by 3-aminobenzamide.

116

INSIGHTS ON THE SECRETORY PATHWAY OF STALK COMPONENTS IN *VORTICELLA CONVALLARIA*, *A. A. Amin*, and *H. E. Buhse, Jr.*, Department of Biological Sciences, University of Illinois at Chicago, Chicago, IL 60607. Like other peritrichs, the vorticellid life cycle comprises two metamorphic stages, the dispersal form (telotroch) and the attached form (stalked zooid). The latter is characteristically distinguished from telotroch by developing a long stalk. The most distal part of the stalk is functionally adapted as a substrate-anchoring device. Components of the stalk are packaged into vesicles, docked to the cell membrane and exocytosed as extracellular matrix in a regulated manner. In this report we block both the stalk elongation and the cell attachment by applying Brefeldin A (BFA) to the telotrochs and the stalked zooids, respectively. BFA is an antiviral antibiotic drug that inhibits the protein secretion by converting the normally stacked cisternal structure Golgi apparatus into vesicular remnants. Using a monoclonal antibody raised to purified stalk extract (Mab 2C10) we also define here the secretory pathway of the stalk components recognized by Mab 2C10.

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SYNTHESIS AND CUSTOMIZATION OF 9-CROWN-3, 10-CROWN-3, 11-CROWN-3, AND 12-CROWN-3 CROWN ETHERS AND THEIR SPECIFIC COMPLEXATION WITH SMALL METAL CATIONS, DEPENDENT UPON DIFFERENT AZA- AND THIA- HETEROATOMIC COMPLEXES. *Bill Brower* and *Douglas Armstrong PhD*, Olivet Nazarene University, Kankakee, IL 60901. The cavities of small crown ethers hold the extraordinary potential of binding specifically with desired small metal cations. The customization is dependent on the size of the cavity, which allows only certain metals to penetrate, and on the type of heteroatoms present, which may attract certain metal cations more strongly than other metals cations. These crowns, if proven to be more effective, could be utilized to collect metal cations from mineral springs and ocean water as well as a purifying agent for metallic waste water.

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GASTROPODS FOUND AT THE FARMDALIAN/WOODFORDIAN TRANSITION IN EAST-CENTRAL ILLINOIS. A.L. Clark and V.P. Gutowski, Department of Geology/Geography, Eastern Illinois University, Charleston, IL 61920. Pleistocene deposits in the Shelbyville moraine system near Charleston contain a wealth of organic remains, including pollen grains, tree stumps, mosses, grasses, seeds, plant fragments, insect remains and whole gastropods. Most remains are found in the Ao horizon of the Farmdale paleosol, or in pro-glacial lake sediments which conformably overlie the Farmdale deposits. Of the gastropods collected, the majority are pupaeform in shape, including *Pupilla, Vertigo, Gastrocopta, Carychium, Columella, Lymnaea,* and *Pomatiopsis*. Other species are naticord or paucispiral in form, including *Succinea. Discus, Hendersonis, Strabilops, Vallonia, Punctum, Euconulus* and possibly *Triodopsis* comprise the discoidal shape.

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A RAT MODEL OF CONTRACTURE AFTER THERAPY. K. Adams, C. Cox, J. DalPonte, L. House, K. Hummel, B. Miller. *Department of Zoology, Eastern Illinois University, Charleston, IL. 61920.* We produced a standardized "injury" to the "calf muscle" in the rat. The hindlimbs were casted for 4 weeks. Previous study demonstrated that the "injury" model produced significant contractures (43% loss of motion [ROM]). For this study we compared "natural healing" (No Rx) to therapy (Rx). Therapy was done with a miniature JAS^{TM} device (AMP, Inc., Effingham, IL.). ROM was measured before injury (pre-ROM) and at 10, 20 and 40 days after the casts were removed (post-ROM).

Significant contracture was induced by the model (pre-ROM of 126 ± 14^{o} vs 54 ± 17^{o} after casting). Ten days of therapy significantly improved ROM in Rx limbs (87 ± 14^{o}) vs No Rx limbs (78 ± 17^{o}). After 40 days, Rx limbs were 103 ± 12^{o} of ROM. The No Rx limbs had 88 ± 15^{o} of ROM. The JAS^{TM} therapy enhanced the recovery of limb movement.

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ISSUES IN HUMAN GENETICS: STUDENT ATTITUDES. J. M. James, Eastern Illinois University, Charleston, IL 61920 and J. F. Smith, Southern Illinois University, Carbondale, IL 62901.
A comparison was made of attitudes and opinions among students who are undergraduate, nonscience majors (group A, EIU) or upper level (undergraduate/graduate) in the biological (group B, EIU) or medical (group C, SIU) sciences toward a variety of issues related to human genetics. Group A gave greater support than B and C to such issues as germline gene therapy, directed genetic counseling, and mandatory carrier screening for groups at high risk. Groups B & C were more supportive than A of the Human Genome Project. Issues in which differences were seen among the three groups were: accountability of physicians in the birth of a child with a prenatally detectable genetic disorder, and importance of genetic factors in behavioral characteristics and IQ. Little difference was seen on educational issues and opinions concerning abortion. Educational and cultural backgrounds may contribute to group differences.

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A LAB EXERCISE IN HUMAN PHYSIOLOGY: BLOOD PRESSURES IN THE LOWER EXTREMITIES. John H. Becker, Scholl College of Podiatric Medicine, Chicago, IL 60610.
All the published manuals for human physiology courses include a blood pressure exercise, which introduces students to arm-cuff sphygmomanometry, and includes a few experimental variations (e.g., postural effects, exercise, cold pressor test) At Scholl College, we have developed other variations which involve blood pressure measurements on the lower extremities. Pressures in the popliteal and posterior tibial arteries can be measured by the auscultatory method, using a thigh or large arm cuff. Systolic pressure can be measured with a cuff and any device that senses pulsatile flow (palpation, Doppler ultrasound, plethysmography). Toe blood pressures can readily be measured using a small digital cuff and a photoplethysmograph. These exercises are of educative value to more than just podiatric medical students for two reasons. First, the diabetes treatment community recommends measuring the ankle:brachial index (ABI) of systolic blood pressures to diagnose peripheral vascular disease. Second, when students discover that ABI exceeds 1.0 in healthy people, it reinforces the concept of reflective wave summation in peripheral arteries.

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LONG-TERM TRENDS (1959-1994) IN FISH POPULATIONS OF THE ILLINOIS RIVER. T.V. Lerczak, R.E. Sparks, and K.D. Blodgett, Illinois Natural History Survey, Havana, IL 62644. Fish populations at 26 stations were yearly sampled by electrofishing during late summer-early autumn to examine trends over time (1962 to 1994) in catches of biological indicator species which could be related to changing environmental quality. Catches of pollution-intolerant (relative to common carp or goldfish) centrarchids (not including green sunfish) showed an upward trend in the lower river (nearest to the Mississippi River) and upper river (nearest to Chicago, a major source of municipal and industrial pollutants). There was a downward trend in common carp catches in all river segments. Goldfish catches showed a downward trend on the upper river, and goldfish were absent or collected in small numbers elsewhere. The number of species representing 95% of the total catch for the middle and upper river was higher in recent years. For most years since 1959, the percentage of benthic fish (e.g., carp) with externally-visible abnormalities increased in the upstream direction, where sediment toxicity is greater. These data reflect water quality improvements, but suggest fish abnormalities are related to contact with contaminated sediments.

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EASTERN WOODRAT POPULATIONS IN SOUTHERN ILLINOIS. E. R. Wagle, A-M. Monty, and G. A. Feldhamer, Southern Illinois University, Carbondale, IL 62901. Until recently, the only extant population of woodrats in Illinois was thought to be at LaRue Pine Hills, Union County. Populations recently have been documented at three other sites: Horse Bluff, Fountain Bluff, and Little Grand Canyon, Jackson County. The populations at Pine Hills and Fountain Bluff are being studied to determine density, age and sex structure, female reproductive rates, and juvenile survival. After 24 months, 37 juveniles (15 ♂♂ and 22 ♀♀), 45 subadults (14 ♂♂ and 31 ♀♀), and 94 adults (42 ♂♂ and 52 ♀♀) have been livetrapped at Pine Hills. A total of 177 individuals has been trapped 1,073 times in 2,960 trap nights (36.3% trap success). Trap success at Fountain Bluff is 19.2%; 61 individuals trapped 220 times in 1,146 trap nights. Through 11 months, 4 juveniles (2 ♂♂ and 2 ♀♀), 12 subadults (3 ♂♂ and 9 ♀♀), and 45 adults (22 ♂♂ and 23 ♀♀) have been trapped. Age and sex ratios of these populations fluctuate seasonally because of births and dispersal of young. Genetic variability among the four populations is being determined, as is feeding habits of the Pine Hills population.

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THE EFFECTS OF SCENT TRAILS ON THE COMMON HOUSE CRICKET, ACHETA DOMESTICA. Joan Stasica, Millikin University, Decatur, IL 62522. The use of scent trails by the common house cricket, Acheta domestica, was tested using a maze. One pathway within the maze was rubbed with warm potato in order to simulate a food scent trail. The crickets were observed, and three aspects of their locomotion were recorded: time to complete maze, backtracking behavior, and climbing behavior. Whether or not the crickets followed the marked trail was also recorded. The hypothesis was that the experimental crickets supplied with a scent trail would finish the maze faster and exhibit less backtracking and climbing behavior than the control crickets. This hypothesis was partially supported by the data. Experimental crickets took longer and backtracked more often than control crickets, though their climbing behavior concurred with the hypothesis. This result could be interpreted to show that while the house cricket is affected by food scent trails, it does not necessarily use these trails in common locomotion.

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LABORATORY ANIMAL CATALOGS OF GENES OF INTEREST IN ENDOCRILOGY AND REPRODUCTION.

A.G. Amador. SIU School of Medicine, Springfield. IL 62794-1315

In last few years, an explosion in the knowledge of genetics has occurred. Gene mapping has exploded to include several vertebrate species. We have previously published a catalog of human genes. We here report two new catalogs. These are the mouse catalog with over 780 loci, the rat catalog with 161 loci, and the Chinese hamster catalog with 20 loci. Because of the large amounts of genes being mapped each month for each species (specially the mouse), all this information becomes confusing even for veteran geneticists, and the volume of it makes it unusable for scientists outside the field of genetics. Therefore, we undertook the development of these catalogs, that include only those loci of at least some interest in the field of endocrinology and reproduction. The starting point was to sift the genes reported in standard databases, and to generate a dedicated list of loci. Thereafter, computer-based updatable catalogs were developed. Finally, permanent scanning of the literature was instituted. This was done in order to detect changes and additions in the status of mapping for the desired category of genes, and that might not be included in other databases. Also, this allows for the generation of timely and independent updates of our own databases.

126

FARM ANIMAL CATALOGS OF GENES OF INTEREST IN ENDOCRILOGY AND REPRODUCTION.

A.G. Amador and *R. H. King*. SIU School of Medicine, Springfield. IL 62794-1315

In recent years, there has been an explosion in the knowledge of genetics. Gene mapping has exploded, and now includes several vertebrate species. We have previously published a catalog of human genes. We now report four new catalogs. These are the bovine catalog with 83 loci, the porcine catalog with 46 loci, the ovine catalog with 28 loci, and the chicken catalog with 16 loci. Because of the large amounts of genes being mapped each month for each species, all this information becomes confusing even for veteran geneticists, and the volume of it makes it unusable for scientists outside the field of genetics. Therefore, the development of these catalogs, that include only those loci of at least some interest in the field of endocrinology and reproduction, was undertaken. The starting point was to sift the genes reported in standard databases, and to generate a dedicated list of loci. Thereafter, computer-based updatable catalogs were developed. Finally, permanent scanning of the literature was instituted. This was done in order to detect changes and additions in the status of mapping for the desired category of genes, and that might not be included in other databases. Also, this allows for the generation of timely and independent updates of our own databases.

127

DETERMINATION OF BAT SPECIES THAT FORAGE AT A STREETLIGHT IN KANKAKEE DURING NOVEMBER. *Bill Brower*, Olivet Nazarene University, Kankakee, IL 60901. Due to the dense aggregations of insects that often develop around an artificial illumantion source, bats tend to exploit streetlights to feed. Novemeber could possibly be a month where hibernation has begun and only certain species may be feeding and taking advantage of the light source. A bat detector was developed and utilized. The streetlight that was monitored was close to a cave-rich ecosystem in Kankakee County. Despite various precipitation and the cold month of November, two different species were detected, *Myotis lucifigus* and *Eptesicus fuscus*.

128

GREEN RIVER STATE WILDLIFE AREA AND MARGINAL ANALYSIS. John L. Kriz and Dianne M. Jedlicka. Joliet Junior College, Joliet IL 60436 and Augustana College, Rock Island, Il 61201. The Green River State Wildlife Area presents ecologists and economists a chance to apply marginal analysis theory to the issue of public land usage by divergent groups. The current management techniques at the Green River State Wildlife Area have brought dog field trialers into conflict with other usage groups such as bird watchers, conservationists and hunters. Marginal analysis can show how the management techniques such as the mowing of paths lowers the marginal social costs and raises the marginal social benefit for the dog field trialers. These same techniques will conversely raise the marginal social costs and lower the marginal social benefit for the other groups. The conclusion of this analysis can explain why there has been an increase in usage by the dog field trialers, a reduction in usage by the other groups and therefore conflict that has developed.

ROSTER OF OFFICIALS OF THE ILLINOIS STATE ACADEMY OF SCIENCE

October 1994 - October 1995

Patricia W. Zimmerman, Executive Secretary
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Springfield, Illinois 62706
217/782-6436; FAX 782-1254

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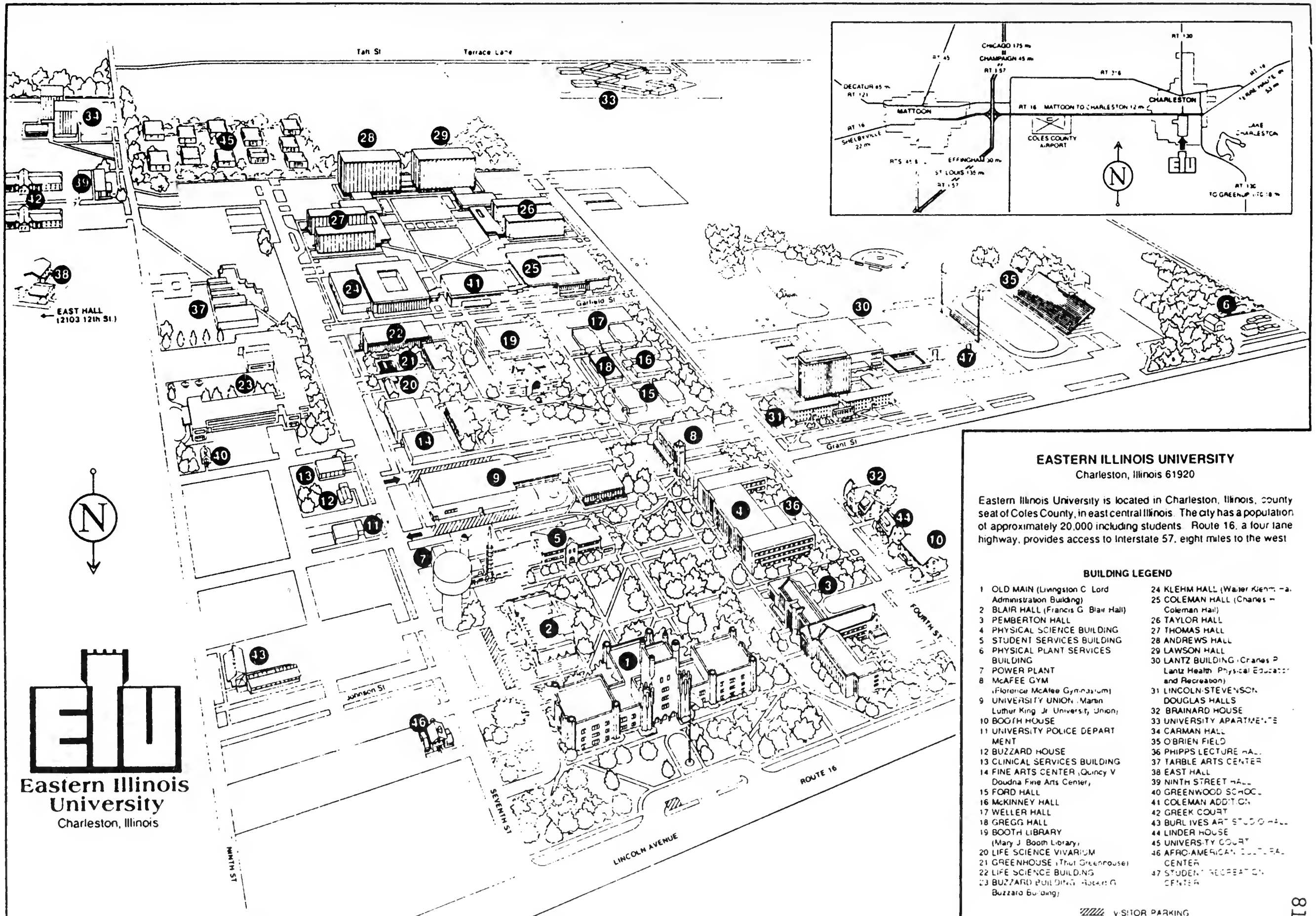

Eastern Illinois University
Charleston, Illinois

EASTERN ILLINOIS UNIVERSITY

Charleston, Illinois 61920

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3 PEMBERTON HALL
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5 STUDENT SERVICES BUILDING
6 PHYSICAL PLANT SERVICES BUILDING
7 POWER PLANT
8 McAFEE GYM (Florence McAfee Gymnasium)
9 UNIVERSITY UNION (Martin Luther King Jr. University Union)
10 BOOTH HOUSE
11 UNIVERSITY POLICE DEPARTMENT
12 BUZZARD HOUSE
13 CLINICAL SERVICES BUILDING
14 FINE ARTS CENTER (Quincy V. Doudna Fine Arts Center)
15 FORD HALL
16 McKINNEY HALL
17 WELLER HALL
18 GREGG HALL
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21 GREENHOUSE (Thot Greenhouse)
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25 COLEMAN HALL (Charles H. Coleman Hall)
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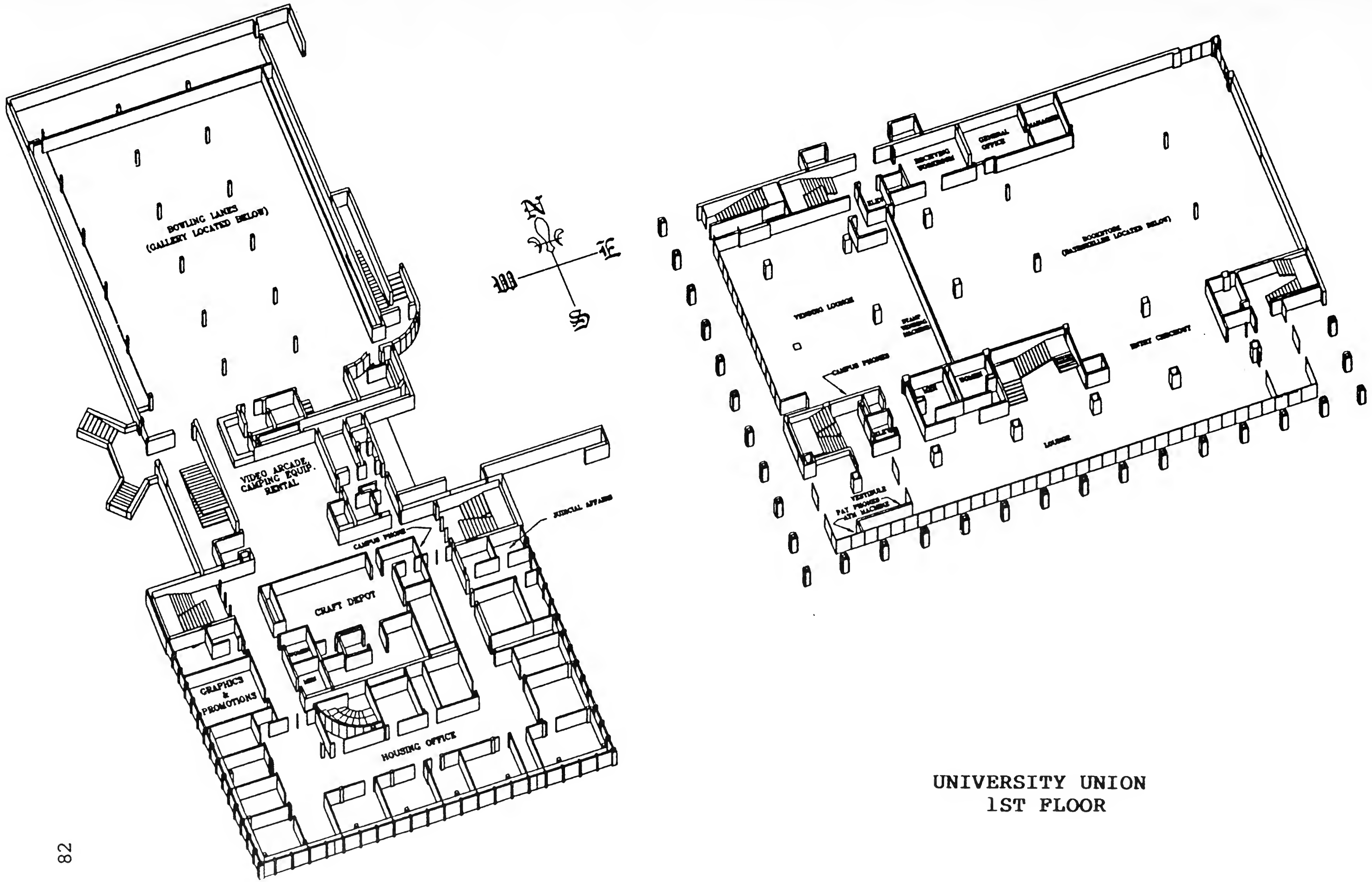

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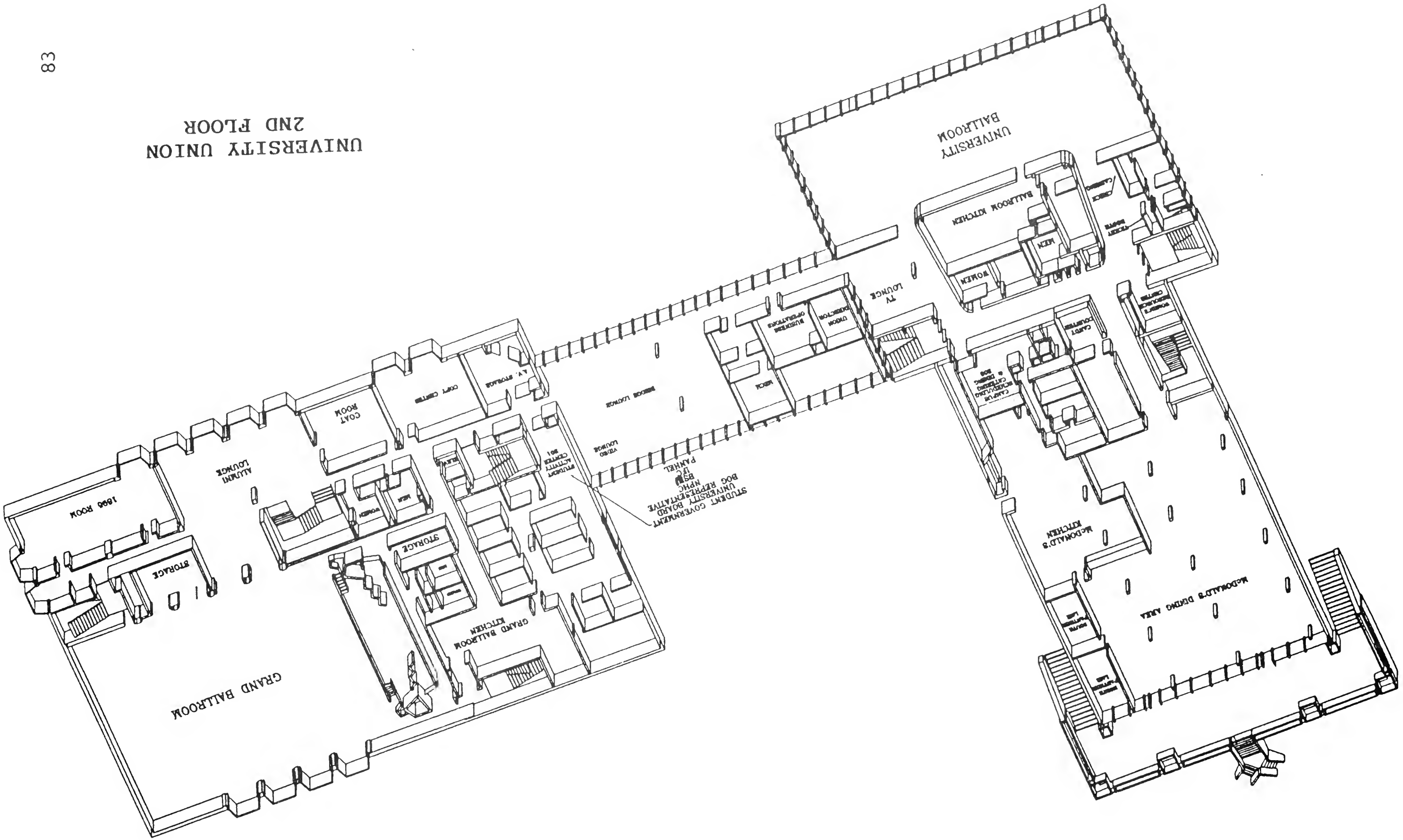

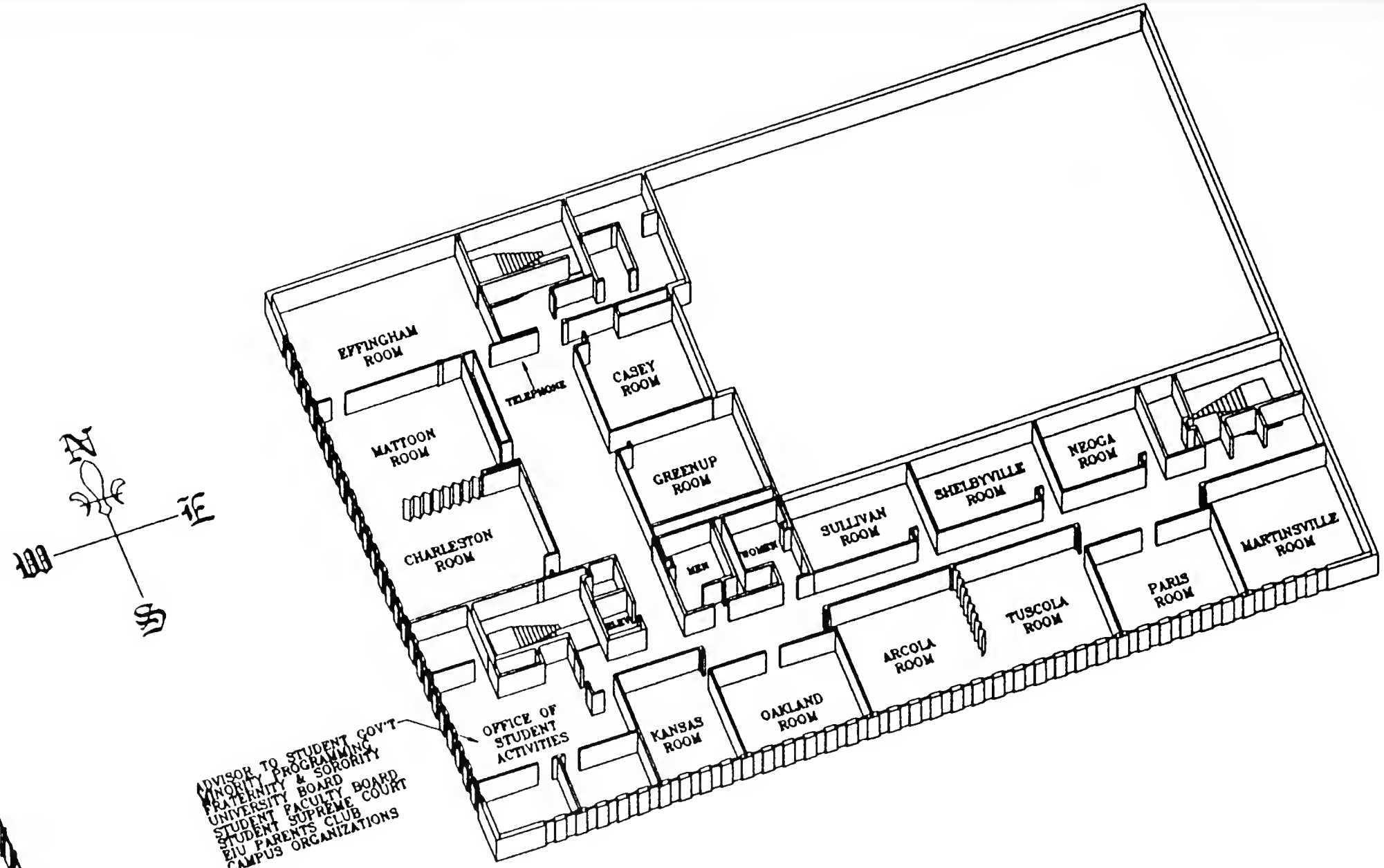

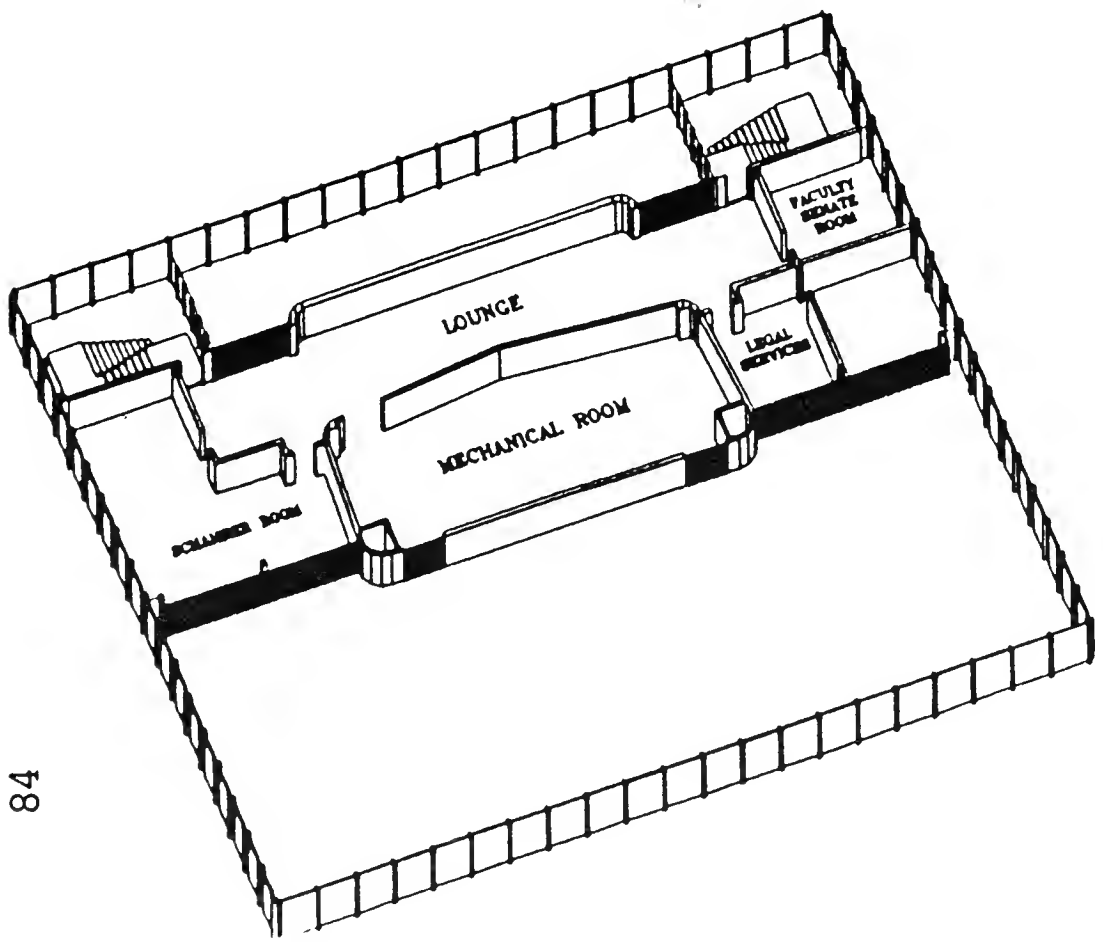

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OCTOBER 6-7, 1995

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Eastern Illinois University, Charleston, Illinois

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